OPERATION MANUAL

6LPA-STP2
6LPA-STZP2

YANMAR

OPERATION MANUAL

MARINE DIESEL ENGINE

6LPA-STP2
6LPA-STZP2

Congratulations on your choice of
YANMAR product from YANMAR CO., LTD.
This Operation Manual describes the operation, maintenance and inspection of the **6LPA-STP2/-STZP2** Yanmar marine diesel engines.
Please read this manual carefully before use, and operate your engine properly under the optimum conditions, should you have any questions or concerns, please do not hesitate to contact your nearest dealer.

California Proposition 65 Warning

Diesel engine exhaust and some of its constitutions 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 hand after handling

YANMAR
MARINE DIESEL ENGINE
MODELS : 6LPA-STP2/-STZP2
OPERATION MANUAL

Thank you for purchasing the YANMAR Marine Diesel Engine.

[INTRODUCTION]

- This Operation Manual describes the operation, maintenance and inspection of the **6LPA-STP2/-STZP2** Yanmar marine diesel engines.

- Read this Operation Manual carefully before operate the engine to ensure that the engine is used correctly and that it stays in the best possible condition.

- Keep this Operation Manual in a convenient place for easy access.

- If this Operation Manual is lost or damaged, order a new one from your dealer or distributor.

- Make sure this manual is transfered to subsequent owners. This manual should be considered a permanent part of the engin and remain it.

- Constant efforts are made to improve the quality and performance of Yanmar products, so some details included in this Operation Manual may differ slightly from your engine. If you have any questions about such difference, please contact your Yanmar Dealer or Distributor.

- For detailed information marine gears, refer to the Marine Gear Operation Manual.

Operation Manual (Marine Engine)	Models	**6LPA-STP2/-STZP2**
	Code No.	0A6LP-G00100

INDEX

page No.

1. FOR SAFE OPERATION

Following the precautions described in this manual will enable you to use this engine with complete satisfaction. Failure to observe any of the rules and precautions, however, may result in injury, burns, fires, and engine damage. Read this manual carefully and be sure you fully understand it before beginning operation.

1.1 Warning Symbols

These are the warning signs which are used in this manual and on the products. Pay special attention to them.

⚠ DANGER

DANGER- Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING

WARNING- Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION

CAUTION- Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.

- The descriptions captioned by **[NOTICE]** are for the particularly important cautions for handling. If you ignore them, the performance of your machine may deteriorate leading to trouble.

1.2 Safety Precautions

(Observe these instructions for your own safety.)

■ Precautions for Operation

⚠ DANGER

Burns from Scalding

- Never remove the filler cap of the fresh water cooler while the engine is still hot. Steam and hot water will spurt out and seriously burn you. Wait until the water temperature has dropped, then wrap a cloth around the cap and loosen it slowly.
- After inspection, refasten the filler cap firmly. If the cap is not secure, steam or scalding water may be emitted during operation causing burns.

⚠ DANGER

Proper Ventilation of the Battery Area

- Be sure the area around the battery is well-ventilated and there is nothing which could start a fire. During operation and charging, hydrogen gas is emitted from the battery and can be easily ignited.

⚠ DANGER

Fires from Oil Ignition

- Be sure to use the correct type of fuel when refueling.
  Mistakenly filling with gasoline or the like will result in ignition.
- Be sure to stop the engine before refueling.
  If you spill fuel, wipe such spillage carefully.
- Never place oils or other flammable material close to the engine as this could result in ignition.

⚠ WARNING

Exhaust Gas Poisoning

- Be sure to establish good ventilation in the engine room with windows, vents, or other ventilation equipment. Check again during operation to be sure that ventilation is good. Exhaust gas contains poisonous carbon monoxide and should not be inhaled.

⚠ WARNING

Moving Parts

- Do not touch the moving parts of the engine (propeller shaft, V-belt, PTO-pulley, etc.) during operation or let your clothing get caught in them as this can result in injury.
- Never operate the engine without the covers on the moving parts.
- Check before starting the engine to see that any tools or cloths used in maintenance have been removed from the area.

⚠ CAUTION

Burns from Contact with Hot Engine Parts

- The whole engine is hot during operation and immediately after stopping.
  The turbocharger, exhaust manifold, exhaust pipe, and engine are very hot.
  Never touch these parts with your body or clothing.

⚠ WARNING

Alcohol

● Never operate the engine while you are under the influence of alcohol or when you are ill or feel unwell as this results in accidents.

■ Safety Precautions for Inspection

⚠ DANGER

Battery Fluid

● Battery fluid is diluted sulfuric acid. It can blind you if it gets in your eyes, or burn your skin. Keep the fluid away from your body. Wash it off immediately with a large quantity of fresh water if you get any on you.

⚠ WARNING

Fire due to Electric Short-Circuits

● Always turn off the battery switch or detach the earth cable (–) before inspecting the electrical system. Failure to do so could cause short-circuiting and fires.

⚠ WARNING

Precautions for Moving Parts

● Stop the engine before you service it. If you must inspect while the engine is operating, never touch moving parts. Keep your body and clothing well clear of all moving parts as this could result in injury.

⚠ CAUTION

Precautions for Removing Hot Oil and Water to Prevent Burns

● If extracting oil from the engine while it is still hot, do not let the oil splash on you.

● Wait until the temperature has dropped before removing cooling water from the engine to avoid getting scalded.

[NOTICE]

Do not alter the diesel engine.

Rebuilding the engine or altering parts to increase the speed or the amount of fuel discharged, etc. will make operation unsafe, and result in damage and shortening of engine life.

[NOTICE]

Disposal of waste materials

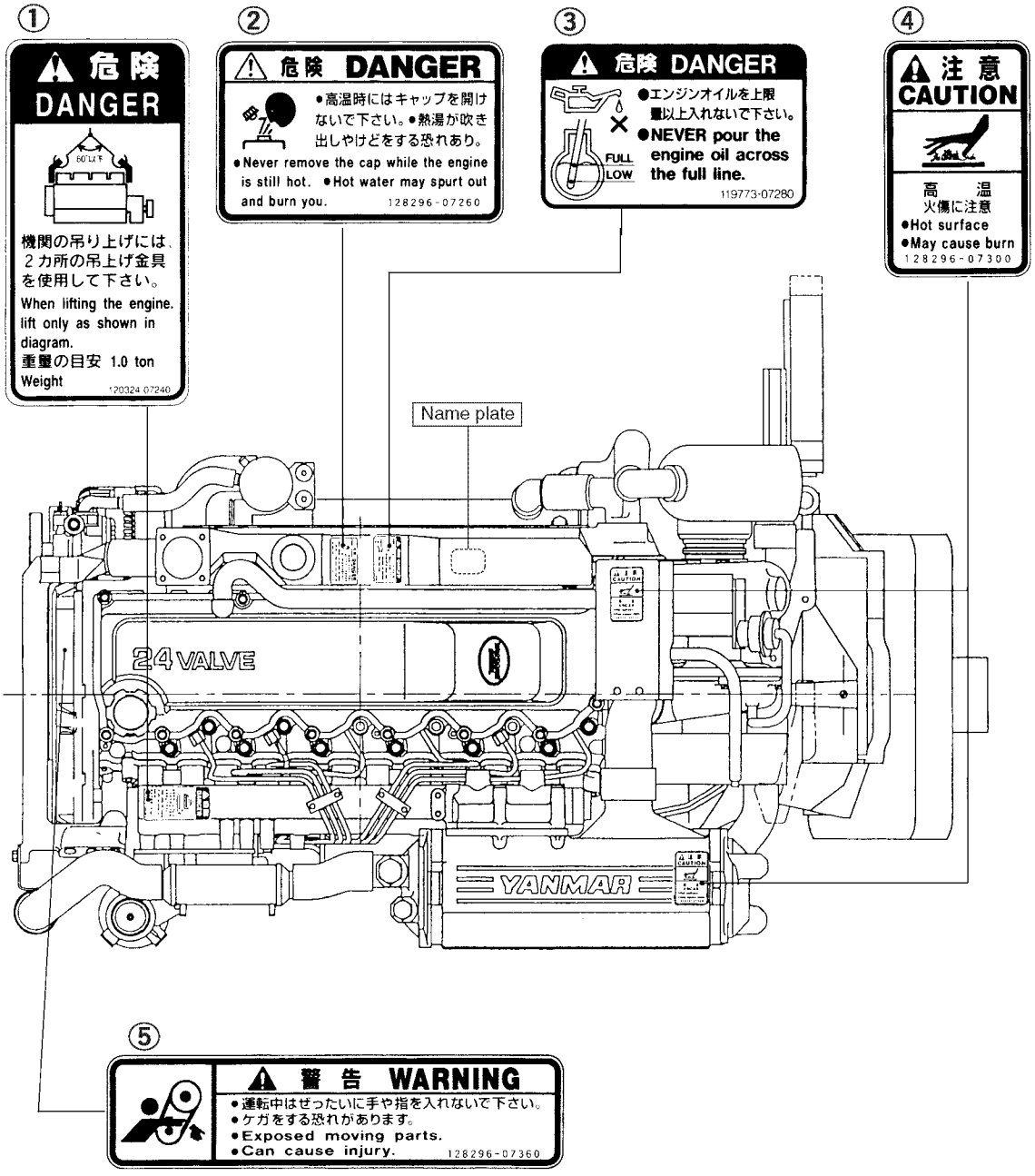
● Put oil or liquids to be disposed in a container. Never dispose of waste oil or other fluids outside, in a sewer, river, or the sea.

● Treat waste materials safely observing all regulations and laws. Ask a waste recovery company to collect and dispose of it.

1.3 Location of Product Safety Labels

To insure safe operation, product safety labels have been attached. Their location is shown in the diagram below. Keep the labels from becoming dirty or torn and replace them if they are lost or damaged. Also replace labels when parts are replaced, ordering them in the same way as for the service parts.

Product Safety Labels, Parts Code Numbers	
①	120324-07240
②	128296-07260
③	119773-07280
④	128296-07300
⑤	128296-07360



The above illustration shows an overhead view of the engine.

2. EXPLANATION OF PRODUCT

2.1 Use, Driving System, etc.

In the case of 6LPA-STP2 engines with marine gear (ZF63A1/KMH50A), connect the propeller shaft to the marine gear output shaft. Also the 6LPA-STZP2 engine are connected the stern drive Bravo.

In order to obtain full performance from your engine, it is imperative that you check the size and structure of the hull and use a propeller of the appropriate size.

The engine must be installed correctly with safe cooling water and exhaust piping and electrical wiring.

To handle the drive equipment, driven systems (including the propeller) and other onboard equipment, be sure to observe the instructions and cautions given in the operation manuals supplied by the shipyard and equipment manufacturers.

The laws of some countries may require hull and engine inspections, depending on the use, size and cruising area of the boat.

The installation, fitting and surveying of this engine all require specialized knowledge and engineering skills.

Consult Yanmar's local subsidiary in your region or your distributor or dealer.

⚠ WARNING

Never modify this product or release the limit devices (which limit engine speed, fuel injection quantity, etc.). Modification will impair the safety and performance of the product and functions and shorten the product life.

Please note that any troubles arising from modification of the product will not be covered by our warranty.

This Operation Manual explains the basic points for standard operation. Variations are explained under the letter emblems for easy reference.

MODEL : **Explanation of indicated model only.**

OPTION : **Explanation of optional parts.**

CUSTOMER : **Explanation of use of parts from other boat manufacturers.**

Where there are no letter emblem sections the explanation applies to all models.

Explanation for driving devices, propellers, etc. and optional parts are not included, and special attention should be paid to the explanations and safety precautions in the operation manuals provided by the boat and equipment manufacturers.

2.2 Engine Specifications

• 6LPA-STP2/-STZP2

Engine model			6LPA-STP2	6LPA-STZP2
Type			Vertical water cooled 4-cycle diesel engine	
No. of clinders			6	
Bore × Stroke		mm	94 × 100	
Displacement		ℓ	4.164	
Fuel stop power at crankshaft		kw(hp)/rpm	*232 (315) / 3800	
Cont. power at crankshaft.		kw(hp)/rpm	211 (286) / 3682	
High idling		rpm	4280 ± 25	
Low idling		rpm	$750\ ^{+25}_{0}$	
Combustion system			Direct injection	
Starting system			Electric starting (12V-2.5kW)	
Charging system		kg	Regulator built in Alternator DC12V-80A	
Cooling system			Constant high temperature fresh water cooling (2 systems : sea & fresh water)	
Lubrication system			Forced lubrication system with trochoidal gear pump	
Direction of rotation			Counter-clockwise (viewed from flywheel side)	
Lube oil capacity	All	ℓ	10.5	
	Oil pan	ℓ	8.4	
Cooling water capacity		ℓ	13.5 (Engine) , 1.6 (Sub-tank)	
Turbochager	Model		RHE62W (IHI made)	
	Type		Water cooled turbine housing	
Dimension (L × W × H) (gear less)		mm	1065 × 671 × 729	1145 × 752 × 799
Dry mass (gear less)		kg	408	428
Recommended battery capacity			12V × 120Ah	
Recommended type of remote control handle			Single lever type only	
Engine installation style			On the flexible engine mount	

(Note) 1. Rating condition : ISO 3046-1, 8665 2. 1hp = 0.7355 kW
3. Fuel condition : Density at 15℃ = 0.840, Fuel oil temperature *: 25℃ at the fuel injection pump inlet

• Notation of Output Power

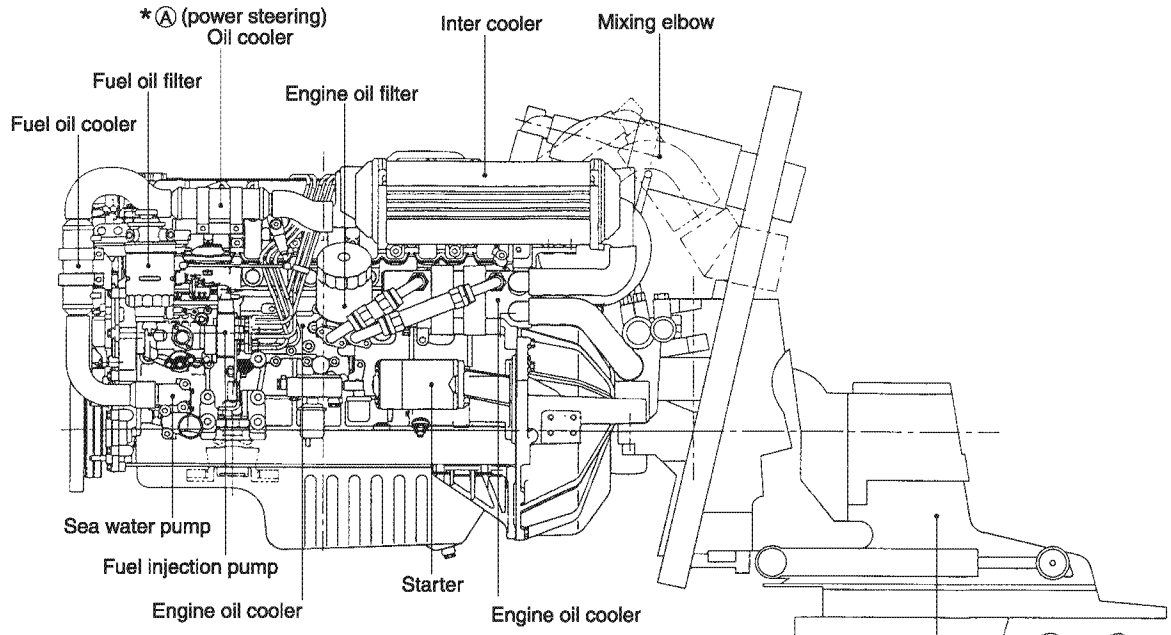
Fuel Temp. / Specific Gravity	25℃	40℃
0.860	323	306
0.840	315	299

● Marine gear (Option)

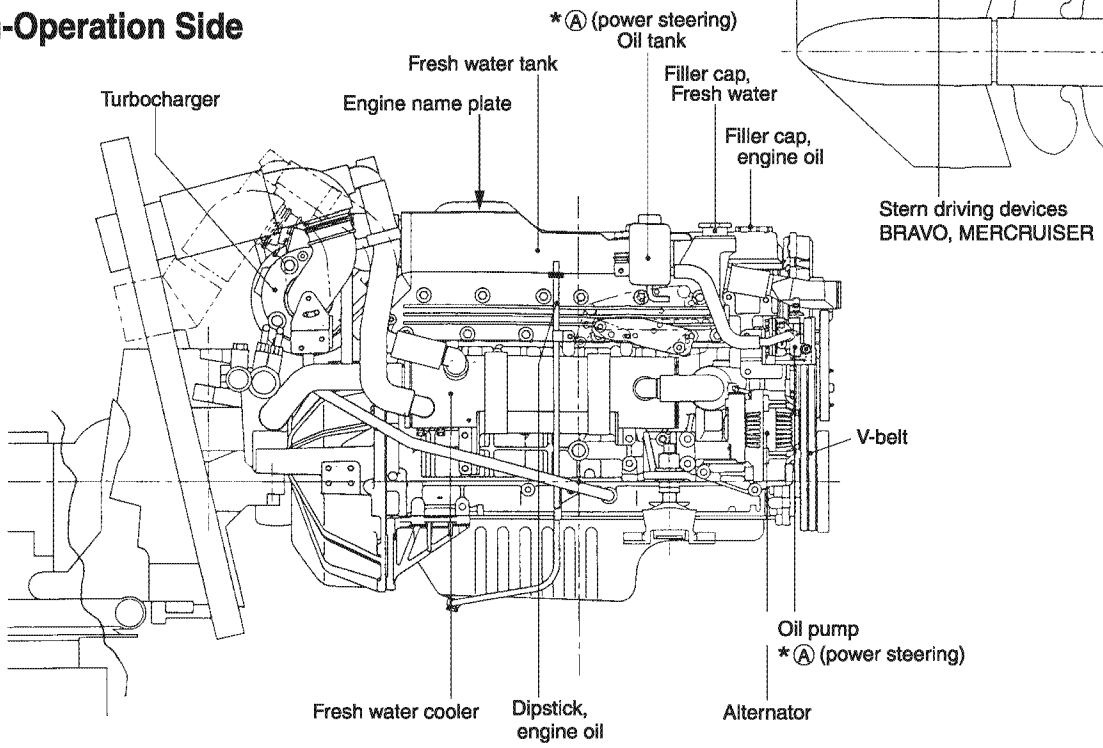
Model	HURTH ZF63A1	Kanzaki KMH50A		MERCRUISER	
			Bravo X-1	Bravo X-2	Bravo X-3
Type	8° down Hydraulic	8° down Hydraulic	Stern drive		
Available engine	6LPA-STP2	6LPA-STP2		6LPA-STZP2	
Reduction ratio ZF63A1 : Ahead/Astern Bravo X-1,2,3 : Both Ahead and Astern	1.22/1.21	1.67/1.67	1.36	1.50	1.36
	1.56/1.58	2.13/2.13	1.50	1.65	1.50
	2.04/2.10	2.43/2.43		1.81	1.65
	2.52/2.53			2.00	1.81
For further detail, refer to the maker's manual					

2.3 Names of Parts

Operation Side (Left side as viewed from the propeller.)



Non-Operation Side



[NOTE]
This illustration shows the **6LPA-STZP2** engine (stern driving device : **BRAVO, MERCRUISER**)
* Ⓐ (indicated) power-steering oil pump, oil tank, oil cooler are parts for the **6LPA-STZP2** engines. **6LPA-STP2** engines do not have them.

2.4 Major Servicing Parts

Name of part	Function
Fuel filter	Removes dust and water from fuel. The filter is a cartridge type, and the filter should be replaced before clogging occurs. A water separator is on the bottom of the filter and should be drained periodically.
Fuel feed pump	This is a mechanical pump used to feed fuel to the fuel injection pump. It is built into the fuel injection pump.
Fuel priming pump	This is a manual fuel pump. Moving the knob on the top of the fuel filter feeds the fuel. The pump is also used to bleed air from the fuel system.
Filler cap (engine oil)	Filler port for engine lube oil.
Dipstick (engine oil)	Gauge stick for determining the level of the engine oil.
Lube oil filter	Filters fine metal fragments and carbon from the lube oil. The filter is a cartridge type, and the filter should be replaced before clogging occurs.
【Cooling Water System】 ◎Fresh water tank ◎Fresh water cooler ◎Cooling water pump	There are two types of cooling systems: seawater and fresh water. This tank stores the fresh cooling water and is connected to the fresh water cooler. Cooling seawater passes through the fresh water cooler to cool the fresh water by heat exchange. After cooling, the cooled fresh water is fed by the cooling water pump to the inside of the engine, around the combustion room, turbocharger, and then returned to the tank.
◎Filler cap	Located on top of the fresh water tank the filler cap closes the filler port. It has two pressure regulating valves (release valve and retraction valve). When the cooling water temperature rises, the pressure inside the fresh water tank increases causing the release valve in the filler cap to open.
◎Subtank	Hot water and steam pass through a rubber hose to the subtank for cooling. (The filler port and the subtank are connected by a rubber hose.) When the load is reduced and the cooling water temperature falls, the pressure in the fresh water tank is lowered, and this activates the retraction valve in the filler cap causing the cool water in the subtank to return to the fresh water tank. This process reduces the consumption of cooling water.
Oil cooler	This heat exchanger cools the engine oil with fresh water or seawater, cooling system. **6LPA-STP2/-STZP2 : multi-plate type (fresh water cooling)** **+ multi-tube type (seawater cooling)**
Turbocharger	The pressurized intake air feeding device: the exhaust gas turbine is rotated by the exhaust gas, and the power is used to rotate the blower. This pressurises the intake air for sending to the cylinder.
Inter-cooler	This heat exchanger cools the pressurized intake air from the turbocharger with seawater.
Anti corrosive zinc	The metal area of the seawater cooling system is prone to electrical corrosion. The anti corrosive zinc is installed in the oil cooler and the fresh water cooler to prevent this. When the anti corrosive zinc becomes worn, parts in the fresh water cooler and oil cooler, etc, will corrode. Periodic replacement of the anti corrosive zinc is necessary.
Starter	This is a DC motor for electrical starting. Electric current causes the pinion gear to engage with the ring gear on the flywheel to start the engine.
Alternator	This is a generator which rotates by V-belt drive to charge the battery during operation.

2.5 Control Equipment

The control equipment consists of the control panel and remote control handle, which are connected by the wires and cables to the control levers for remote control operation.

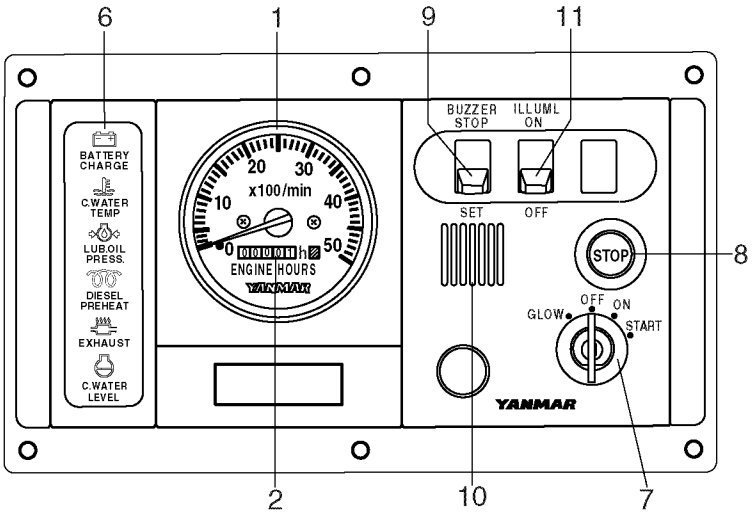
2.5.1 Control Panel (Optional)

The control panel has the following gauges and alarm devices (optional accessories):

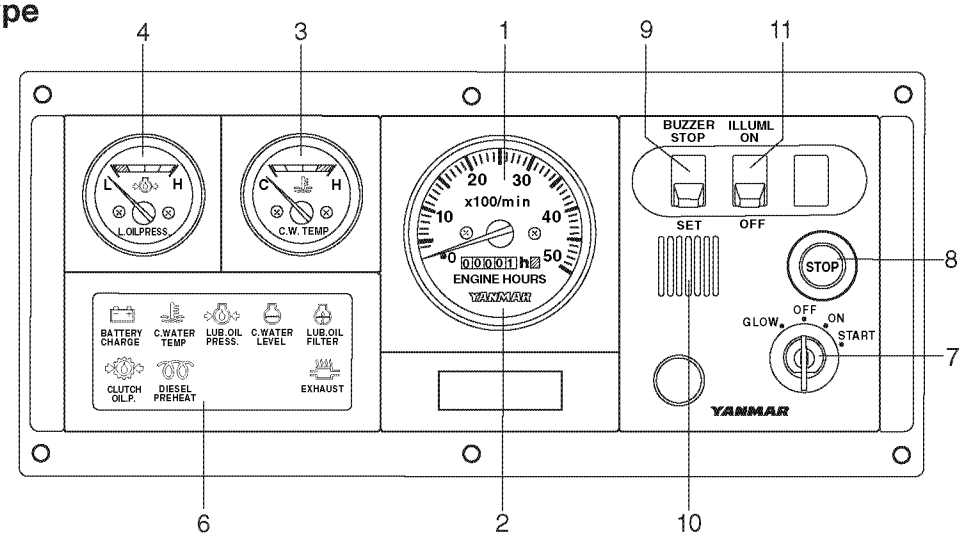
● Available , — Not available

No.	Model		New B-type	New C-type	New D-type
7	Switch unit	Key switch (Starter switch)	●	●	●
8		Engine stop switch	●	●	●
10		Alarm buzzer	●	●	●
9		Alarm buzzer stop switch	●	●	●
11		Illumination switch for meters	●	●	●
6	Alarm lamp unit	Battery not charging	●	●	●
		C.W. high temperature	●	●	●
		L.O. low pressure (engine)	●	●	●
		C.W level	—	●	●
		Exhaust (C.S.W.flow)	●	●	●
		Fuel filter	●	●	●
		Gear oil (stern drive)	—	●	●
1	Tachometer uni	Tachometer with hour meter	●	●	●
4	Sub meter unit	LO. pressure meter	—	●	●
3		C.W. temperature meter	—	●	●
5		Boost meter (Turbo)	—	—	●
12	Clock unit	Quartz clock	● (option)	● (option)	●

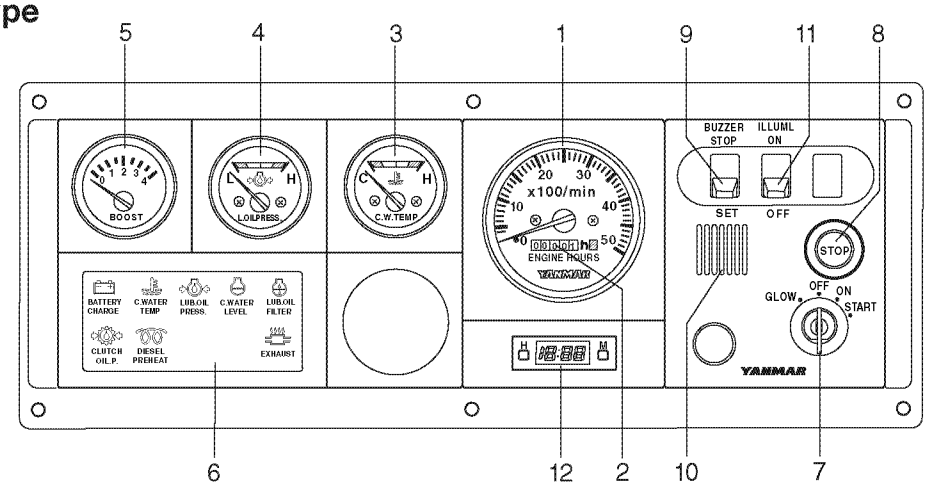
● **New B-type**



● New C-type



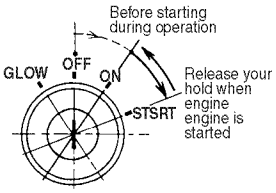
● New D-type



● Available switches (for alarm) and senders (for meter)

			6LPA-STP2	6LPA-STZP2
Switches	Battery not charge		○	
	C.W.high temperature		○	
	L.O low pressure		○	
	C.W. level		△	
	Exhaust (C.S.W flow)		△	
	Gear oil (Stern)		△	
	Fuel filter		○	
Senders	Tachometer		○	
	C.W. temperature		△	
	L.O.pressure		△	
	Boost		△	
	C.W.temp.	For two stations	△	
	L.O. press.		△	
○ : Standard △ : Optional				

(1) Gauges and Equipment

Gauges & Equipment	Functions
Starter switch 	OFF: The switch key can be inserted or removed. All power is turned off. O N: For engine operation. Gauges and alarm devices are turned on. START: For engine starting. When the key is released after starting, it moves automatically to ON. GLOW: For the air heater (optional)
	(Note) ●The engine cannot be stopped by the starter switch.
Engine stop switch	Press the button to stop the engine by fuel cut. And continue to push the stop button until the engine has come to a complete stop.
Alarm buzzer	The buzzer sounds if an abnormality arises. See explanation under (2).
Warning lamps	The lamps come on when an abnormality arises. See explanation under (2).
Buzzer stop switch	The switch is used to stop the buzzer noise temporarily. Do not turn the buzzer off except when inspecting for an abnormality.
Illumination switch	Switch for lighting control panel.
Hour meter	Total operation hours are shown in the window below the tachometer. Refer to the figure as a standard for periodic inspections.
Lube.Oil. pressure meter	The needle shows engine oil pressure.
Cooling water temperature meter	The needle shows engine cooling fresh water temperature.
Boost meter	The needle shows intake air pressure (intake air boost pressure of turbocharger.)
Heat up indicating lamp for air heater  **DIESEL PREHEAT**	The lamp comes on when the air heater is heated up to start the engine easily under low temperature condition. (Refer to 4.3.2) (The lamp is located in warning lamp display column.)

(2) Alarm Devices

OPTION

When there is some problem during operation, the alarm buzzers and lamps will come on.

●Alarm buzzer

When the various alarm lamps come on, the alarm buzzer will come on at the same time and sound. However, no alarm buzzer will sound when the charge lamp comes on.

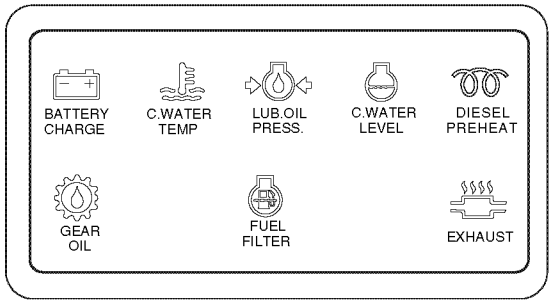
●Buzzer stop switch

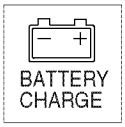
When the buzzer sound is no longer necessary, it can be turned off with the **STOP** switch on the right.

●Alarm lamps

The alarm monitor window indicates the trouble spot when one of the symbols shown below lights up. When operation is normal the alarm lights are off; however, should some problem arise, the sensors will pick it up and cause the light behind the appropriate symbol to come on.

Alarm monitor window (for C/D type)





①BATTERY CHARGE

When the charge is abnormal,
the lamp will come on. When charging begins the lamp will go off. (A buzzer will not sound when the lamp comes on.)

②C.WATER TEMP

When the temperature of the cooling fresh water exceeds the maximum (95°C or higher), the lamp will light. Continuing operation at temperatures exceeding the maximum will result in engine damage and seizure. Check the load and the fresh water cooling system for any abnormalities.

③LUB. OIL PRESS. (Engine)

When the lube oil pressure falls below specified the oil pressure sensor will register this and the lamp will come on. Continuing operation with insufficient oil will result in engine damage and seizure. Check the oil level and lub.oil system.

④C.WATER LEVEL

When the amount of cooling water in the fresh water tank falls below normal, the sensor will register this and cause the lamp to come on. Continuing operation with insufficient cooling water will result in engine damage and seizure. Check the cooling water level in the fresh water tank and cooling system.

⑤GEAR OIL

When the amount of gear oil falls below specified the sensor will register this and cause the lamp to come on. **6LPA-STZP2**
Continuing operation with insufficient oil in the gear device will result in damage and seizure. Check the amount of gear oil.

⑥FUEL FILTER

When the drain inside the water separator in the fuel filter becomes excessive, the sensor will cause the lamp to come on. Clean out the drain in the water separator. If operation is continued without cleaning, it will become impossible to feed fuel to the engine and damage or seizure of the fuel injection pump will result.

⑦EXHAUST

When the amount of cooling seawater being discharged becomes too small, the sensor will activate the lamp. Continuing operation under this condition will result in damage of the engine and seizure. Check for clogging in the seawater cooling system and damaged parts.

(3) Functions of Warning Devices

When the key switch is turned on, the alarm devices functions as follows

1) Turning the key to ON:

① Warning buzzer sounds

② The BATTERY CHARGE, EXHAUST (seawater flow) and LUB. OIL PRESS. come on. The C.WATER TEMP, FUEL FILTER, GEAR OIL and C.WATER LEVEL do not come on.

(Note) When the warning buzzer and lamps function as above, everything is normal.

2) When the key switch is turned to START to start the engine and then returned to ON after the engine starting up.

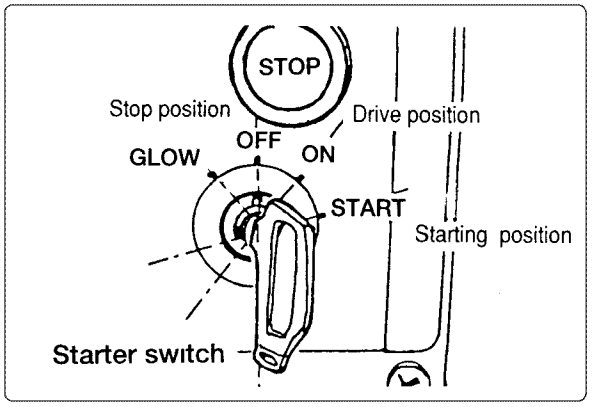
① The warning buzzer stops sounding.

② All warning lamps go off. After the engine starts up, make it the rule to check alarm devices. If they do not work normally, contact your dealer.

Function of Alarm Devices		
Key Operation	Before starting **OFF →ON**	After Starting **START →ON**
Alarm Buzzer	**On**	**Off**
Alarm Lamps		
Charge Lamp	**On**	**Off**
Cooling Water Temperature	**Off**	**Off**
Engine Oil Pressure	**On**	**Off**
Cooling Fresh Water Level	**Off**	**Off**
Oil/Water Separator Leve	**Off**	**Off**
No Cooling Seawater	**On**	**Off**
Gear Oil Level	**Off**	**Off**

(4) Starter Switch

This is the main switch for starting engine operation. It is a rotary-type 3-step switch. Position is changed by turning the key in the switch.



OFF is the position where the engine is stopped. All current is cut off. The key can be inserted and removed in this position.

ON is the position for operation. Current flows to the instruments and alarm devices.

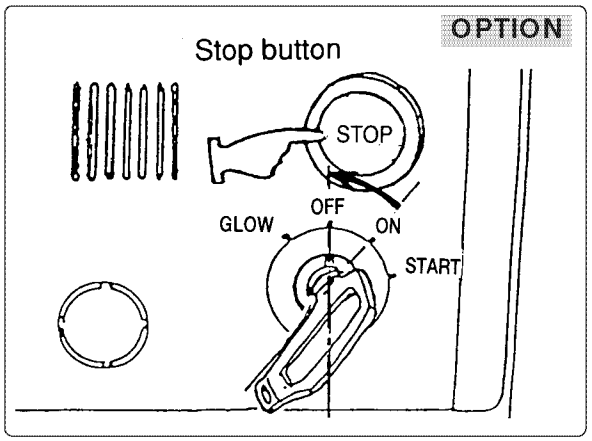
START is the position for starting. When the starter turns, the engine starts. The key returns automati-cally to the ON position when you remove your hand.

GLOW is the position for heating the glow plug. The glow plug is heated before starting to warm up the intake air and to aid starting during cold weather.

(5) Stop button

The engine is stopped by pushing the stop button on the right of the control panel. When the stop button is pushed, the solenoid valve on the fuel injection pump works to cut off the fuel supply and stop the engine.

Continue to push the stop button until the engine has come to a complete stop.



2.5.2 Remote Control Handle

The engine is controlled by the remote control handle located in the cockpit. The speed control lever on the engine side and clutch lever on the marine drive are connected by remote control cable with the remote control handle in the cockpit. There are the following kinds of remote control handles. When using other kinds of remote control devices, consult their operation manuals.

Morse Remote Control Handle

OPTION

This is a single-handle control device connected by a remote control cable. It operates the clutch to neutral, forward, and reverse and controls the engine speed.

Model MT-3 : Top mounting type. **Model MV :** Side mounting type.

The labels for operation on the handle are:

▲FWD : Forward

NEUTRAL: Clutch disengage position.

THROTTLE: Position to reduce engine speed.

▼REV : Reverse

Operation of the handle is as follows.

• **Starting and stopping**

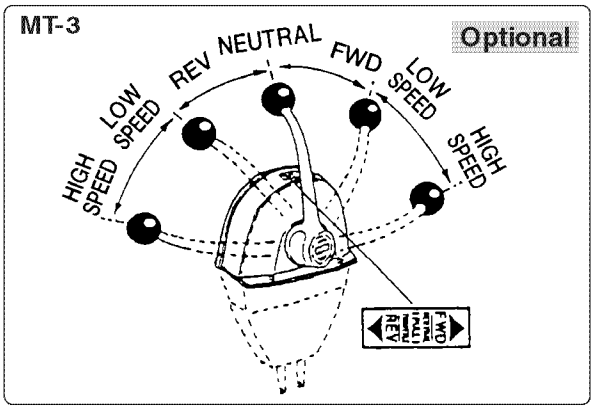
Put the handle in NEUTRAL. This puts the clutch in the disengage position (stop) and idles the engine at a low speed.

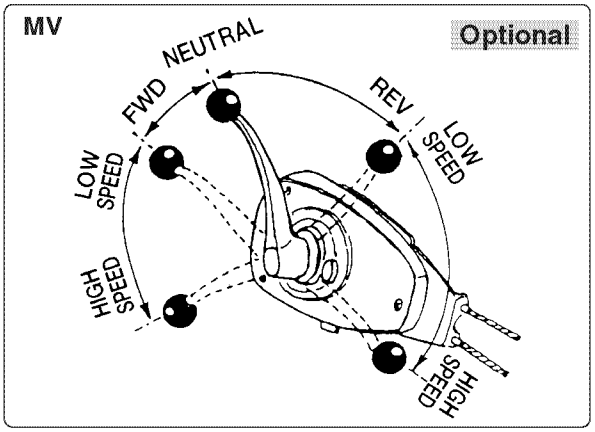
• **Forward**

Move the handle from NEUTRAL to ▲**FWD** (forward). This engages the clutch in forward and simultaneously increases the engine speed. Pushing the handle further in the same direction increases engine speed to full speed.

• **Reverse**

Move the handle from NEUTRAL to▼**REV** (reverse). This engages the clutch in reverse and simultaneously increases the engine speed. Pushing the handle further in the same direction increases engine speed to full speed.





• **Free throttle operation**

When the boat is stopped (clutch is in neutral position), the idling speed of the engine can be increased in the following manner.

①Leave the handle lever in **NEUTRAL.**

②Disengage the clutch.

MT-3: Pull out the handle lever all the way.

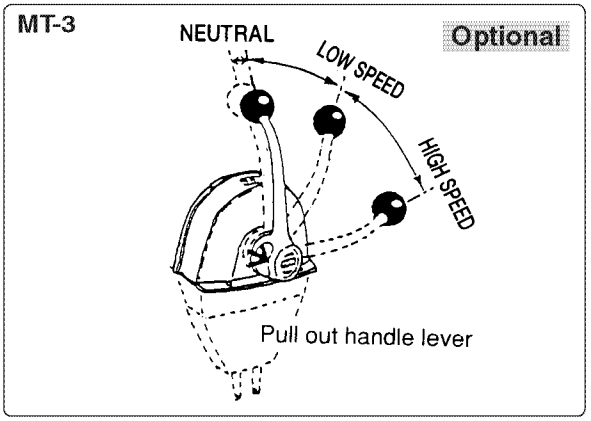
MV : Pull out the free throttle button next to the handle lever.

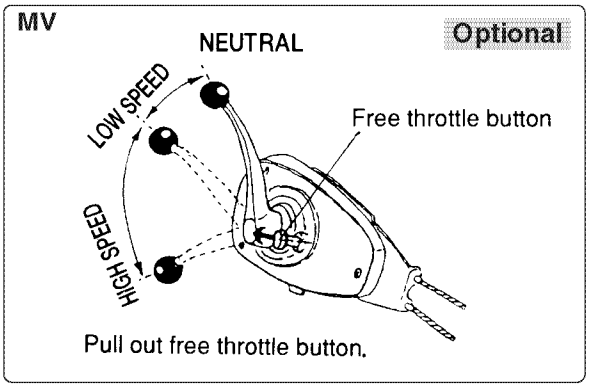
③With the lever or button pulled out, move the handle lever in either the forward or reverse direction to increase idling speed.

• Returning to normal operation from free throttle operation.

MT-3: Return the handle lever to NEUTRAL. The lever will return automatically to the normal position.

MV: Return the handle lever to NEUTRAL. Push the free throttle button in.





3. BEFORE OPERATION

3.1 Fuel Oil, Lube Oil and Cooling Water

3.1.1 Fuel oil

[NOTICE]

Use of fuels not recommended in this Operation Manual may cause a decrease in engine performance and cause components to fail.

(1) Selection of fuel

Use the following diesel fuels for best engine performance:

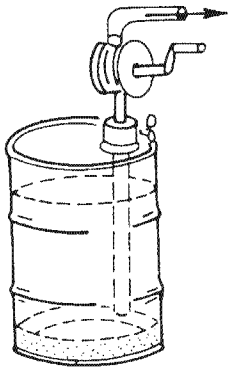
BS2869 A1 or A2, ASTM D975 No.1-D or No.2-D, EN590, ISO 8217 DMX

Fuels equivalent to Japanese Industrial Standard, JIS. No. K2204

Cetane fuel number should be 45 or greater

(2) Fuel Handling

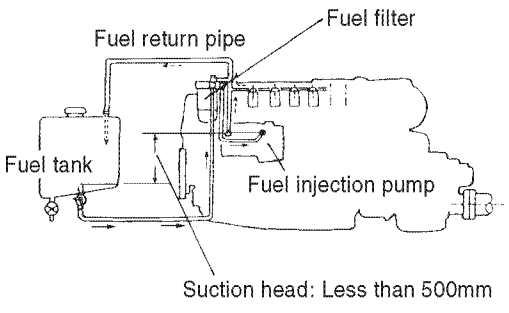
1) Water and dust in the fuel oil can cause operation failure.
   Use containers which are clean inside to store fuel oil. Store the containers away from rain water and dust.
2) Before supplying fuel, let the fuel container rest for several hours so that water and dust in the fuel are deposited on the bottom. Pump up only the clean fuel.
3) Use fuel with a Cetane number of over 45.
4) When supplying fuel to a new boat for the first time, be sure to extract all fuel from the F. O. tank and check for impurities in the fuel.



Pump up only fuel above the down half, leaving dreg accumulated on the bottom.

(3) Fuel Piping CUSTOMER

Install the fuel pipe from the fuel tank to the fuel pump in accordance with the diagram to the right. Be sure to attach a drain cock to the fuel tank to enable dirt and water which have settled at the bottom of the tank to be drained off.



3.1.2 Lube Oil

(1) Selection of Engine Oil

Use the following lube oil:

***API Classification·····CD**

(Standards of America Petroleum Institute)

***SAE Viscosity ·····15W40**

(Standards of Society of Automotive Engineering)

[NOTICE]

Using other than the specified lube oil will lead to seizure of parts inside the engine and gear device, abnormal wear, and shorten engine life. It will also effect the starting ability and power output.

(2) Selection of Marine Drive Oil

Refer to the operation manual for the marine drive unit for the selection of the proper lube oil.

- For **MERCRUISER's** stern-driven device **(BRAVO)** use the following lube oil.

6LPA-STZP2

System Oil	Specified lube oil
Drive oil	Quicksilver® High Performance Gear Lube
Power steering oil (6LPA-STZP2)	Quicksilver® Power Trim and Steering Fluid or Dexlone-II
Power trim oil	Quicksilver® Power Trim and Steering Fluid or SAE 10W-30 or 10W-40 engine oil

Quicksilver® is registered trademark of Brunswick Corporatoin.

For further more instructions, refer to the maker's manual.

- Follow the maker's instructions for the marine gears.

(ZF63A1 (6LPA-STP2))

(3) Handling the Lube Oil

- When handling and storing lube oil, be careful not to allow dust and water to enter the lube oil. Clean around the filler port before refilling.
- Do not mix lube oils of different types or brands.

Mixing may reduce the lubricating performance. Different oils are used for the engine and the marine drive unit.

Be careful to use the correct oil for each one and store in separate clearly labeled containers.

3.1.3 Cooling Water

[NOTICE]

Be sure to add Long Life Coolant/Antifreeze (LLC) to cooling fresh water.
In cold seasons, the LLC is especially important.
Without LLC, cooling performance will decrease due to scale and rust in the cooling water line. Without LLC, cooling water will freeze and expand, breaking various parts.

(1) Handling of Cooling Water

1) Always use purified soft water or distilled water for the fresh water. Never use dirty water or hard water.
   Impurities in the fresh water cause scale and rust to build up on the cooling water passage, reducing cooling efficiency and causing the engine to overheat.
2) Choose LLC which will not have any adverse effects on the materials (cast iron, aluminum, copper, etc.) of the engine's fresh water cooling system.
   Consult your Yanmar dealer or distributor on the use of coolant/antifreeze, and detergents. The coolans/antifreezes, which are good performance for example, are shown below.
   - TEXACO LONG LIFE COOLANT ANTIFREEZE, both standard and pre-mixed.
     Product codes 7997 and 7998.
   - HAVOLINE EXTENDED LIFE ANTIFREEZE/COOLANT.
     Product code 7994.
3) Strictly use the proper mixing ratio of LLC to fresh water as instructed by the LLC maker. If incorrect ratio of LLC to fresh water is used, the cooling performance of the cooling water will drop and the engine may become overheated.
4) Do not mix different types (brand) of LLC, chemical reactions may make the LLC useless and engine trouble could result.
5) Replace the cooling water periodically according to the maintenance schedule given in this operation manual.
6) Remove the scale from the cooling water system periodically according to the instructions this operation manual.

[NOTICE]

Excessive use of LLC also lowers the cooling efficiency of the engine.
Be sure to use the mixing ratios specified by the LLC maker for your temperature range.

3.2 Supplying Fuel

⚠ DANGER

Fires from Oil Ignition

- **Be sure to use the correct type of fuel when refueling. Mistakenly filling with gasoline or the like will result in ignition.**
- **Be sure to stop the engine before refueling. If you spill fuel, wipe such spillage carefully.**
- **Never place oils or other flammable material close to the engine as this could result in ignition.**

3.2.1 Filling the Fuel Tank

Before supplying fuel, flush the fuel tank and the fuel system parts with diesel fuel or kerosene.

Fill the tank with clean fuel which has not been contaminated with water or dust.

Fill the tank to approximately 90% of its capacity, and take care not to let the fuel spill over during operation.

3.2.2 Bleeding the Fuel System

Bleed the fuel system according to the following procedure. When there is air in the fuel system, the fuel injection pump will not be able to function.

①Check the amount of fuel in the fuel tank, if insufficient replenish.

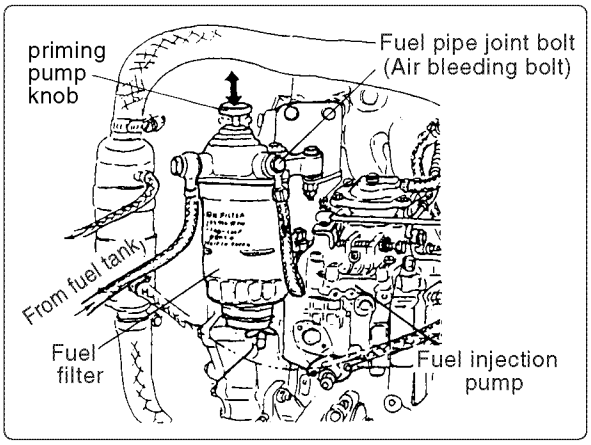
②Open the fuel cock of the fuel tank.

③Loosen the fuel pipe joint bolt on the fuel filter outlet by turning it 2~3 times with a spanner.

④Feed the fuel with the priming pump.
The priming pump is on the top of the fuel filter.
Move the priming pump knob up and down until fuel mixed with air bubbles flows out of the pipe joint bolt.

⑤When the fuel coming out is clear and not mixed with any bubbles, tighten the pipe joint bolt.

⑥Check no leakage of fuel oil from the seals of the pipe joint bolt during moving the priming pump knob up and down.



3.3 Supplying Engine Lube Oil

Fill with the specified amount of engine oil.

①Remove the oil filler cap on the top of the valve rocker cover and fill with oil.

②Remove the oil dipstick and check the level of the oil with the gauge on the dipstick.
Oil should be filled to the maximum limit on the dipstick gauge.

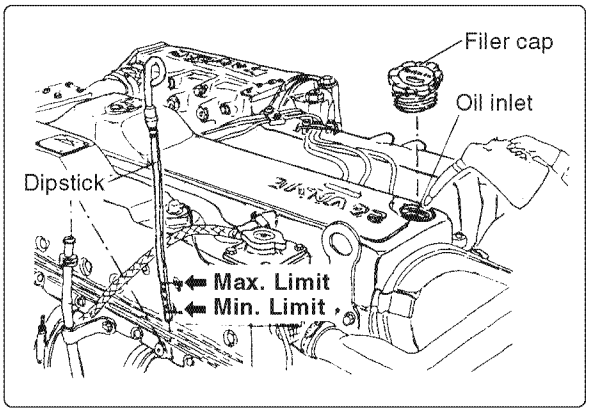
Engine oil capacity :

6LPA-STP2/-STZP2 : 10.5 ℓ

③Replace the dipstick and tighten the filler cap firmly by hand.

[NOTICE]

Do not overfill.
Overfilling will cause oil to be sprayed out from the breather during operation and into the turbocharger, and lead to engine problems.



3.4 Supplying Marine Drive Oil

Supply lube oil in accordance with the marine drive instructions.

[NOTICE]

Do not overfill.
Overfilling will cause oil to be sprayed out during operation and effect the efficiency of the marine drive.

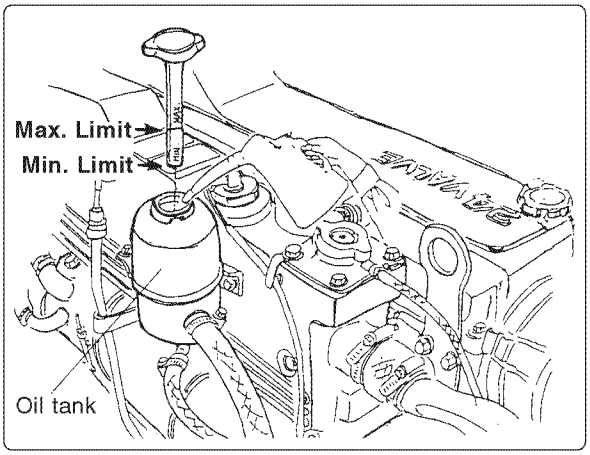
●For **MERCRUISER's** stern-driven device **(BRAVO)** there is a power steering oil service tank on the engine side. Fill with the specified amount of lube oil.
After taking piping for power steering system.

6LPA-STZP2

①Remove the cap from the power steering oil service tank (on the side of the fresh water tank) by turning it counter-clockwise, and insert lube oil.

②Fill with oil to the maximum limit marked on the dipstick attached to the inside of the cap.
To measure the oil level, wipe the dipstick with a cloth, and then measure the oil level by inserting the dipstick and tightening the cap. Resupply with the necessary amount of oil under initial operation.

③Replace the cap and tighten it.



3.5 Supplying Cooling Water

⚠ DANGER

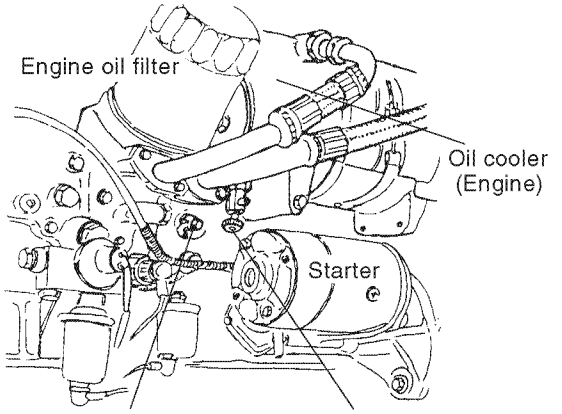
Burns from Scalding

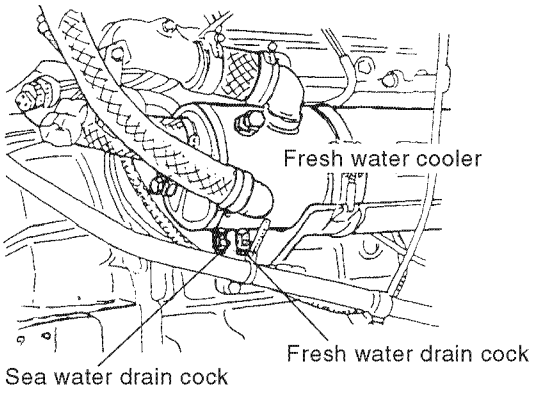
- **Never remove the filler cap of the fresh water cooler while the engine is still hot.**
  Steam and hot water will spurt out and seriously burn you. Wait until the water temperature has dropped, then wrap a cloth around the cap and loosen it slowly.
- **After inspection, refasten the cap firmly. If the cap is not secure, steam or scalding water may be emitted during operation causing burns.**

Fill the fresh water tank and the subtank with fresh cooling water.

①Before filling, check to be sure the drain cocks (indicated in the figures) are closed.

Model	Seawater cooling system	Fresh water cooling system
6LPA-STP2/-STZP2	2	2



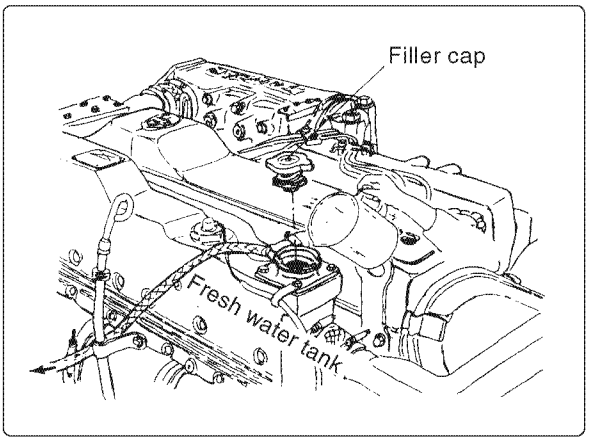


②Remove the filler cap of the fresh water tank by turning the cap counter clockwise 1/3 of a turn.

③Pour cooling water slowly into the fresh water tank so that air bubbles do not develop. Supply until the water overflows from the filler port.

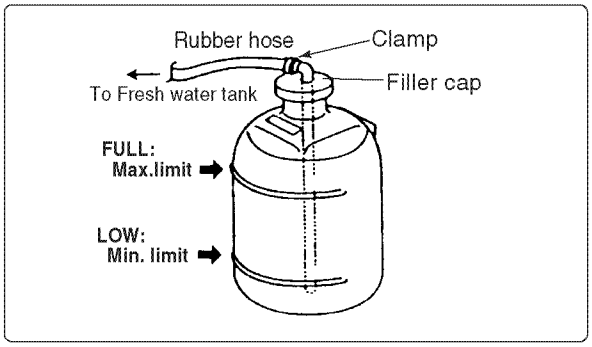
Fresh water tank capacity : 13.5ℓ

④After supplying cooling water, replace the filler cap and tighten it firmly. To replace the cap, align the detents at the back of the cap with the notches on the filler port and turn clockwise 1/3 of a turn.



⑤Remove the subtank cap and fill with water to the maximum limit, **FULL**. Replace cap.
Subtank capacity : 1.6ℓ

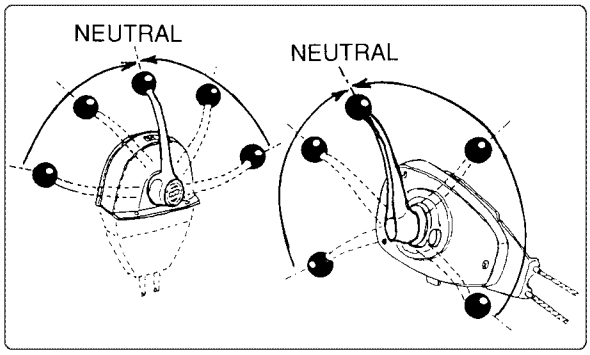
⑥Check the rubber hose connecting the subtank to the fresh water tank. Be sure the hose is securely connected and there is no looseness or damage. When the hose is not watertight, an excessive amount of cooling water will be consumed.

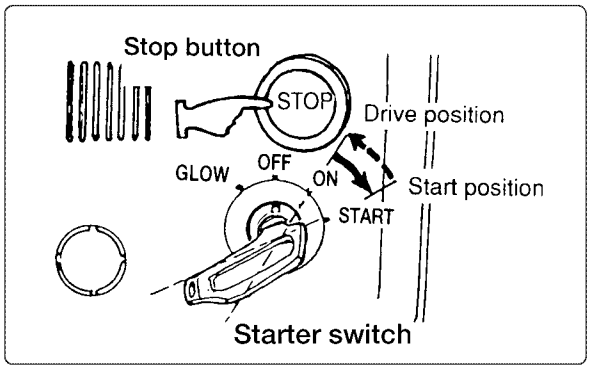


3.6 Cranking

When the engine is being used for the first time or if it has not been used for a long period of time, perform cranking before starting to distribute oil to all of the parts. Using an engine which has been stored for a long period of time without the cranking procedure may result in engine seizure, since there will no longer be oil on the moving parts after storage.

①Open Kingston cock. (Optional)
②Open the fuel tank valve.
③Put marine drive in **NEUTRAL**
④Turn the battery switch on.
⑤Crank the engine.
Push the stop button to stop fuel ignition while cranking.
1) Put the key into the starter switch.
2) Turn the key to the ON position.
The alarm buzzer should sound and alarm lamps come on. This is normal (see 2.5.1(3))
3) While pushing the stop button, turn the key to the **START** position and hold it there. The engine will begin turning.
If you remove your hand from the stop button, the engine will start. Do not take your hand off the button.





⑥Continue cranking the engine for about 5 seconds, checking for abnormal sounds.
⑦Return the key to the **OFF** position. The engine will stop.

3.7 Checking the Lube Oil and Cooling Water

When lube oil, gear oil, power steering oil, and cooling water are put in for the first time, or after they have been replaced, their levels should be checked after a trial operation. Oil and water will be distributed to the various parts during the operation, lowering the levels of oil and water. Replenish to the proper amounts.

- ●Supplying engine lube oil → **See 3.3**
- ●Supplying marine drive oil → **See 3.4**
- ●Supplying cooling water → **See 3.5**

4. HOW TO OPERATE

⚠ WARNING

Alcohol

- Never operate the engine while you are under the influence of alcohol or when you are ill or feel unwell as this results in accidents.

⚠ WARNING

Exhaust Gas Poisoning

- Be sure to establish good ventilation in the engine room with windows, vents, or other ventilation equipment. Check again during operation to be sure that ventilation is good. Exhaust gas contains poisonous carbon monoxide and should not be inhaled.

Moving Parts

- Do not touch the moving parts of the engine (propeller shaft, V-belt, PTO-pulley, etc.) during operation or let your clothing get caught in them as this can result in injury.
- Never operate the engine without the covers on the moving parts.
- Check before starting the engine to see that any tools or cloths used in maintenance have been removed from the area.

⚠ CAUTION

Burns from Contact with Hot Engine Parts

- The whole engine is hot during operation and immediately after stopping. The turbocharger, exhaust manifold, exhaust pipe, and engine are very hot. Never touch these parts with your body or clothing.

4.1 Inspection Before Starting

Be sure to check the following items daily before starting the engine.

(1) Visual Check

Check for the following:

If any problem is found, do not use the engine until repairs have been completed.

●Oil leakage from the lube oil system. ●Fuel oil leakage from the fuel system

●Water leakage from the cooling water system ●Loosening or loss of bolts

●Damage to parts

(2) Checking and Resupplying Fuel Oil

Check the fuel level inside the fuel tank and supply with the recommended fuel if necessary.

→See 3.2

(3) Checking and Resupplying Engine Oil

①Check the engine oil level with the oil dipstick.

②If the oil level is low, supply with the recommended lube oil using the filler port.

Supply oil up to the maximum mark on the oil dipstick. →See 3.3

(4) Checking and Resupplying Marine drive Oil

①Refer to the instructions accompanying the marine drive for the amount of lube oil.

②Supply with the recommended oil if necessary. → **See 3.4**

(5) Checking and Resupplying Cooling Water

⚠ DANGER

Burns from Scalding

- **Never remove the filler cap of the fresh water tank while the engine is still hot. Steam and hot water will spurt out and seriously burn you. Wait until the water temperature has dropped, then wrap a cloth around the cap and loosen it slowly.**
- **After inspection, refasten the filler cap firmly. If the cap is not secure, steam or scalding water may be emitted during operation causing burns.**

①Check the cooling water level in the subtank.

If the water level is close to the minimum limit (indicated "LOW"), remove the subtank cap and fill with fresh water to the maximum limit (indicated "FULL").

②When the water level in the subtank is too low, remove the filler cap for the fresh water tank and check the amount of cooling water in the fresh water tank. Fill with fresh water to overflowing if the level is low. → **See 3.5**

- Check the fresh water level before operation while the engine is cold.
  Checking the water level while the engine is hot is dangerous, and the cooling water reading will be misleading due to thermal expansion.
- Check and supply cooling water daily at the subtank.
  Do not remove the fresh water tank filler cap regularly.
- The amount of water in the subtank will increase during operation. This is normal.
  After stopping the engine, the cooling water cools down and the extra water in the sub tank returns to the fresh water tank.

[NOTICE]

If the cooling water runs out too often, or if the water level in the fresh water tank falls without any change in the subtank water level, there may be some leakage of water or air. In such cases, consult your Yanmar dealer or distributor without delay.

(6) Checking the Remote Control Handle

Be sure to check that the remote control handle lever moves smoothly before use. If it is hard to operate, lubricate the joints of the remote control cable and also the lever bearings. If the lever comes out or there is play in the lever, adjust the remote control cable. → **See 5.2.4(4)(5)**

(7) Preparing Reserves of Fuel, Lube Oil, and Cooling Water

Have sufficient fuel ready for the day's operation. In addition, have a reserve of fuel, lube oil, and cooling water (sufficient for at least one refill) for the port close to the operation area in case of emergencies.

4.2 Checking the Control Panel and Alarm Devices

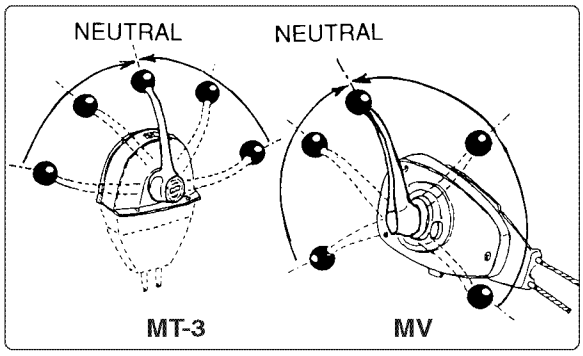
Be sure to check the alarm devices and other instruments on the panel before and after starting the engine. If the devices are not working properly, it is impossible to prevent any problems arising from insufficient oil and water in the engine. Make checking the alarm and other devices before and after starting a regular practice. If having the optional control panel New B or New C or New D-typ, refer to 2.5.1(2)

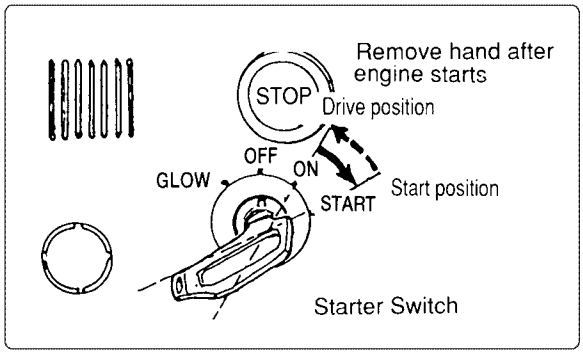
4.3 Starting

4.3.1 Daily Starting

Follow the following procedures for starting under normal conditions.

①Open the kingston cock (optional).
②Open the fuel tank cock (local supply).
③Put the remote control handle in **NEUTRAL.**
④Turn on the battery switch.
⑤Insert the key into the starter switch and turn it to **ON,** the buzzer sounds and the alarm device lamps (BATTERY CHARGE, EXHAUST and LUBE OIL PRESS) come on (refer to 2.5.1(3)), indicating that the alarm equipment is working properly.
⑥Turn the key to **START** to start the engine. When the engine has started, remove your hand from the key. The key will automatically return to the **ON** position.
Check to see that alarm lamps have gone off and the buzzer has stopped.





4.3.2 Starting Under Low Temperature Conditions

When starting the engine under low temperature conditions (approx 0℃ or lower), use the air heater (optional) to enable easier starting.

- Turn the starter key from the **OFF** position to **GLOW.** Continue to hold the key in the **GLOW** position to heat up the air heater for about 15 seconds.
- Then, return the starter key to **START** to start the engine.

[NOTICE]

Do not leave the air heater on for longer than 20 seconds at a time. Leaving the air heater on for longer periods of time will result in damage.

Note : When you choose the air heater (optional), we recommend you to choose the control panel (optional) having the air heater heat up indicating lamp. (New B, C, D-type).
When the air heater is heated up, the lamp comes on to turn the key to START position.

4.3.3 Restarting After Starting Failure

When attempting to restart the engine after starting failure, be sure that the engine is at a complete stop before turning the starter switch key. If the engine is restarted while the engine still has not stopped, the pinion gear of the starter motor will be damaged.

- When the engine will not start after several attempts, check the fuel system. If there is air in the fuel system, the fuel will not be fed and starting will not be possible.
  After bleeding air from the system, attempt to restart the engine. →See 3.2.2

[NOTICE]

Do not hold the starter switch on for more than 15 seconds at a time. If the engine does not start the first time, wait for about 15 seconds before trying again.

4.3.4 After the Engine has Started

(1) Warming-up running

After the engine has started, let it run for about 5 minutes. This warms up the engine and distributes oil to all of the parts.

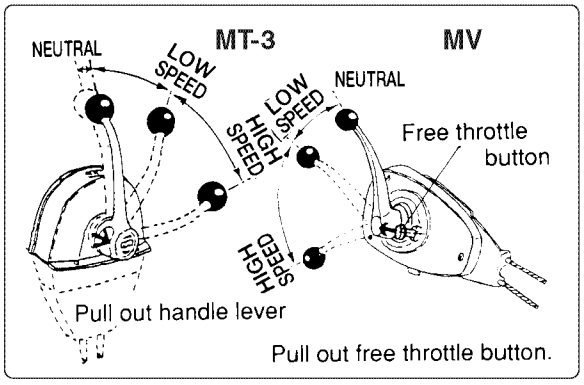
[NOTICE]

The engine will seize if it is operated when cooling seawater discharge is too small or if load is applied without any warming up operation.

■Morse Remote Control Handle

①Leave the remote control handle in **NEUTRAL**.

②Pull out the handle lever (MT-3) or the free throttle button (MV) and adjust the speed to no more than 1500rpm and run the engine at low speed with no load.



(2) Checking for problems

While warming up the engine, check the following items.

①Check that the meters and alarm devices on the control panel are normal. →See 2.5.2

②Check for water or oil leakage from the engine.

③Check that exhaust color, engine vibrations and sound are normal.

④Check that sufficient cooling water is discharged from the seawater outlet pipe.
Operation with too little seawater discharge will burn the impeller of the seawater pump.
If seawater discharge is too small, stop the engine immediately, identify the cause and repair

- Is the kingston cock open ?
- Is the inlet of the kingston cock clogged ?
- Is the seawater suction hose broken, or does the hose suck in air due to a loose joint ?

4.4 Adjusting the Engine Speed

Adjust the speed of the engine by moving the remote control handle slowly and smoothly. Move the handle forward and adjust the speed between low speed and high speed.

■For the Morse remote control handle, adjust the speed between ▲**FWD** and ▼**REV.**

[NOTICE]

For a new engine be especially careful not to change speeds abruptly or attach a heavy load for the first 50 hours of operation. Doing so will result in damage and shorten the life of the engine.

4.5 Clutch Operation for the Marine Drive

4.5.1 Forward, Neutral, Reverse

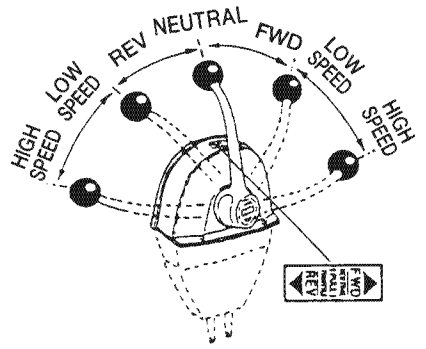
Use the remote control handle to operate the clutch for the marine drive (FORWARD, NEUTRAL, REVERSE). Use a single lever type remote control handle.

- Return the handle to **NEUTRAL** before moving it to another position securely. Always move the handle smoothly; never change positions abruptly.
- Be sure to securely position the handle in FORWARD, NEUTRAL, or REVERSE.

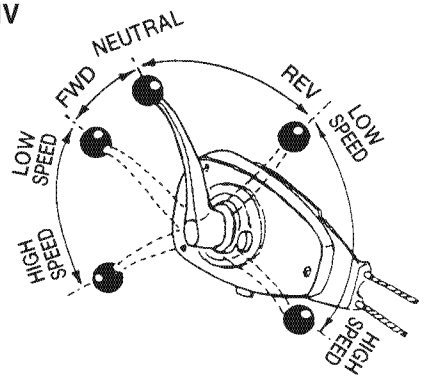
■Morse Remote Control Handle (optional)

- Put the handle in NEUTRAL (middle position) to stop the boat. The engine will idle at low speed.
- Move the handle to ▲FWD to go forward. When the clutch is engaged in forward, the speed will increase.
- Move the handle to ▼**REV** to go in reverse. When the clutch is engaged in reverse, the speed will increase.

MT-3



MV



4.6 Check During Operation

Always be on the look out for problems during engine operation.
Pay particular attention to the following.

(1) Is sufficient water being discharged from the seawater outlet pipe ?

If the discharge is small, stop the engine immediately, identify the cause and repair.

(2) Is the exhaust color normal ?

The continuous black exhaust smoke shows engine overloading.
This shortens the engine's life, so should be avoided.

(3) Are there abnormal vibrations or noise ?

Do not operate at speeds which produce violent vibrations.
Depending on the hull structure, engine and hull resonance may suddenly become great at a certain engine speed range, causing heavy vibrations. Avoid operation in this speed range. If you hear any abnormal sounds, stop the engine and inspect.

(4) Alarm buzzer sounds during operation.

If the alarm buzzer sounds during operation, lower the engine speed immediately, check the alarm lamps, and stop the engine for repairs.

(5) Is there water, oil, or gas leakage, or are there any loose bolts ?

Check the engine room periodically for any problems.

(6) Is there sufficient oil in the fuel tank ?

Replenish fuel oil in advance to avoid running out of fuel during operation.

(7) When operating the engine at low speed for long periods of time, race the engine once every 2 hours.

How to Race the Engine

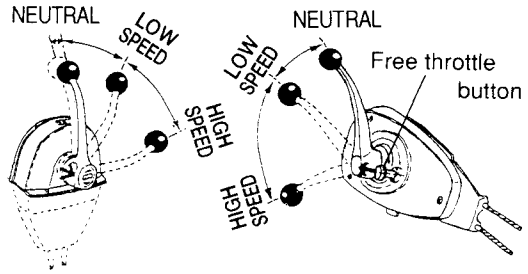
■Morse Remote Control Handle

Pull out the handle lever (MT-3) or the free throttle button (MV) and shift the engine speed from high to low several times.

Racing the engine removes carbon built up in the combustion chamber and around the fuel injection valve.
Neglecting to race the engine will become poor snoke color and drop engine performance.

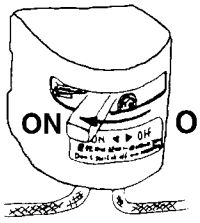
[NOTICE]

Never turn off the battery switch or spark the battery cable during operation. Damage to parts in the electric system will result.



Pull out the handle lever — **MT-3**

Pull out free throttle button — **MV**



Battery Switch (Local supply)

4.7 Stopping the Engine

Stop the engine in accordance with the following procedures.

①Stop the boat.
Put the remote control handle in **NEUTRAL** to stop the boat.

②Be sure to race the engine before stopping it.
→See 4.6 (7)

③Cool down the engine at low speed (1000rpm or lower) for about 5 minutes.

④Continue to push the stop button until the engine is completely stopped. If you release the button before the engine has completely stopped, it may restart.

⑤Turn the starter switch to OFF, remove the key and place it in a safe place.

⑥Turn off the battery switch.

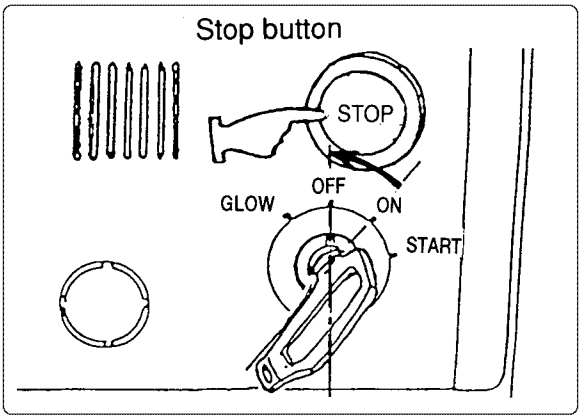
⑦Close the fuel tank cock.

⑧Close the kingston cock.

In the rare instance where the engine does not stop when the stop button is pushed, stop the engine by closing the fuel cock on the fuel tank.

[NOTICE]

Stopping the engine suddenly after operating at high speed without cooling it down will cause the engine temperature to rise quickly resulting in deterioration of the lube oil and sticking of parts.

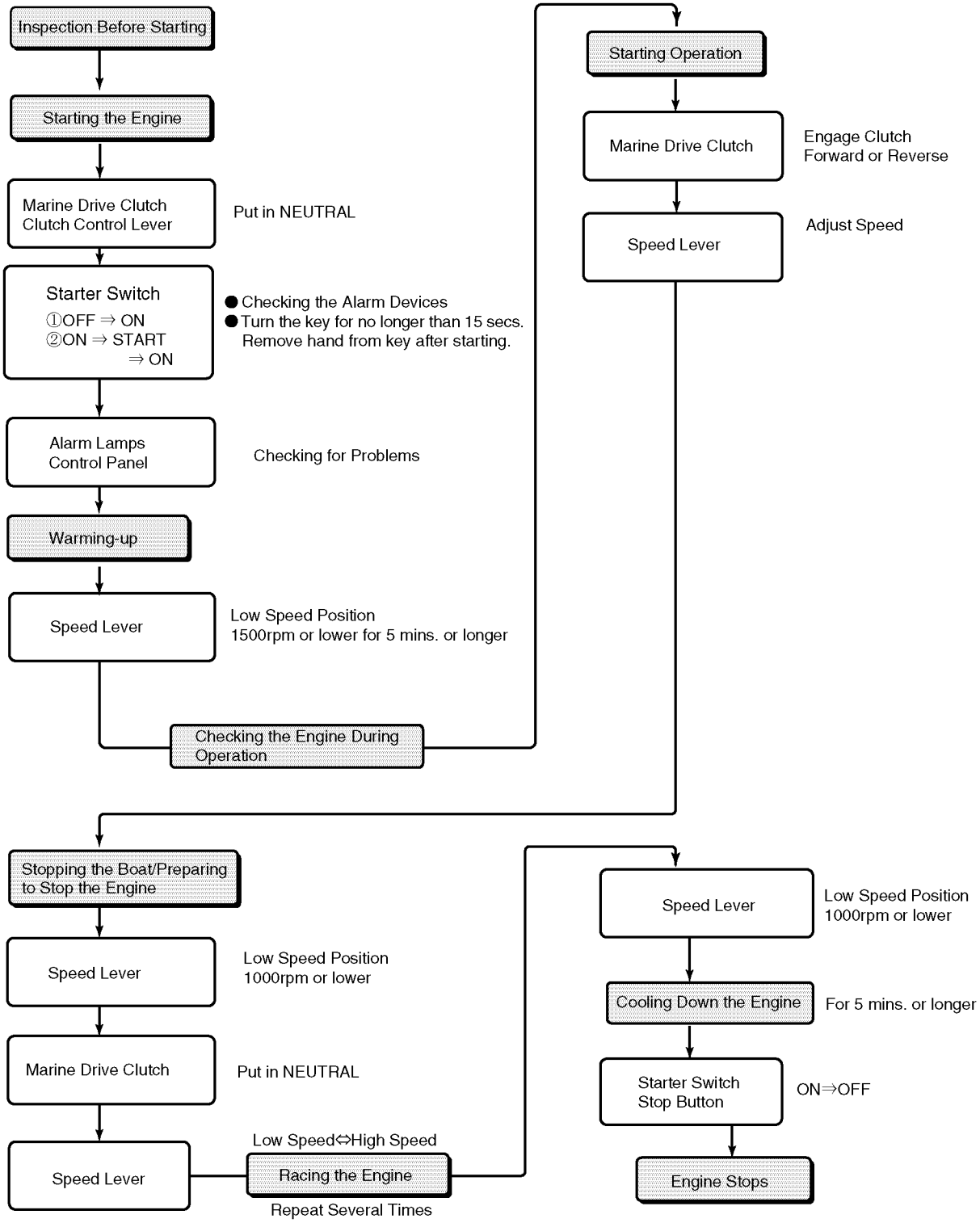


[NOTICE]

Neglecting to close the kingston cock will allow water to leak into the boat and may cause it to sink. Be sure to close the cock.

4.8 Operation Procedure

The following diagram shows the procedures for operation explained up to this point.
Parts of the operation may differ depending on the marine drive and remote control system being used. Accompanying operation manuals should be read carefully and understood.



4.9 Long-Term Storage

4.9.1 Before storing for long periods of time

(1) Periodic Inspection

If the time for a periodic inspection is close, perform it before storing the engine for a long period of time (3 months or more).

(2) Draining the Cooling Water

When not using LLC, be sure to drain the fresh water from the inside of the engine.

⚠ CAUTION

Precautions for Removing Hot Water to Prevent Burns

Wait until the temperature has dropped before removing cooling water from the engine to avoid getting scalded.

Drain the water from both the seawater system and fresh water system.

[NOTICE]

If the water is not drained, it may freeze and damage parts of the cooling water system .

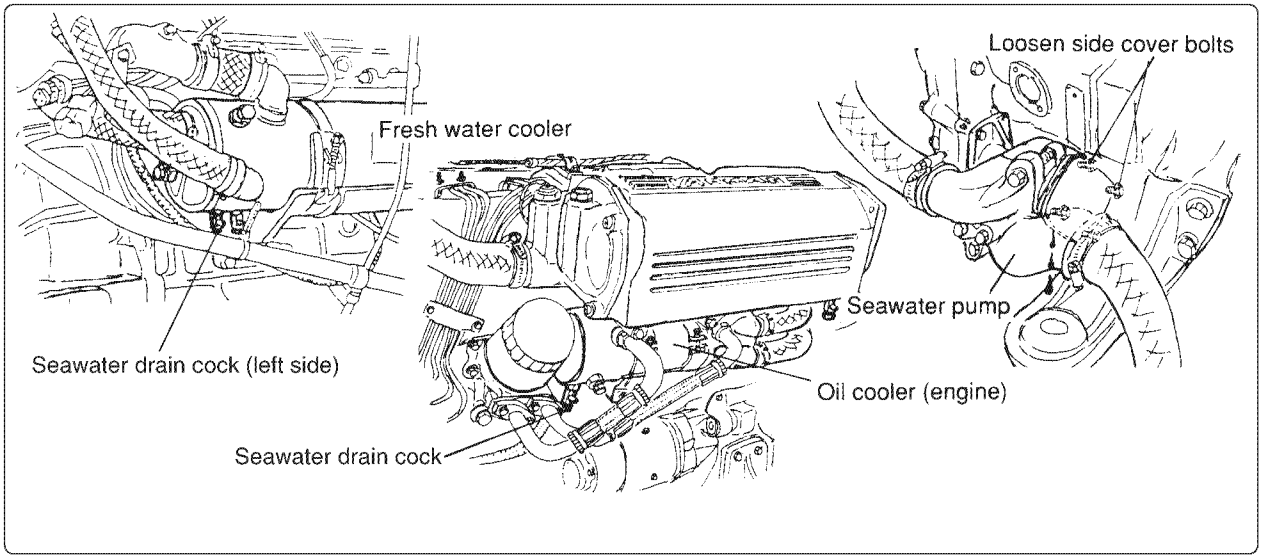
■ **Draining the seawater from the seawater system**

①Open the seawater drain cock on the seawater side of the fresh water cooler and drain off the seawater.

②Open the seawater drain cock on the oil cooler and drain off the seawater.

③Loosen the bolts (4) on the side cover of the seawater pump and move the cover to drain off the seawater inside.

④After draining off the water, tighten the water drain cocks and replace the side cover on the seawater pump.



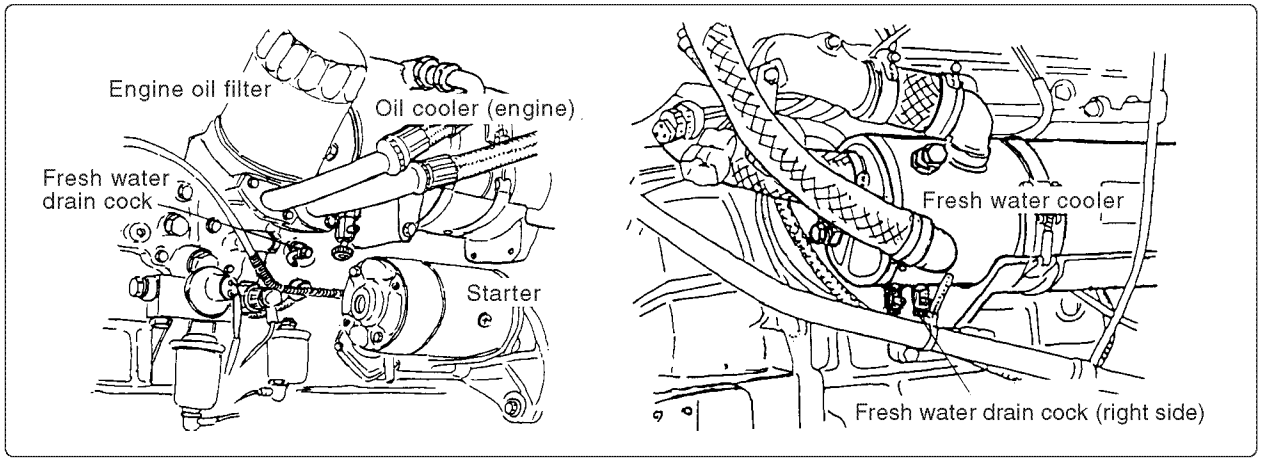
■Draining the Water From the Fresh Water System

If antifreeze (LLC) has not been used to the fresh cooling water, be sure to drain the water from the fresh water system.

①Open the drain cock at the side of the cylinder block, and drain off the fresh water inside.

②Open the fresh water cooler cock and drain off the water inside.

③Close the drain cocks after draining the water.



(3) Cleaning, Draining Fuel Oil, Greasing

- Clean the outside of the engine wiping off any dust or oil.
- To prevent condensation inside the fuel tank, either drain off the fuel or fill the tank.
- Grease the exposed area and joints of the remote control cable and the bearings of the remote control handle.

(4) Safeguarding the Engine Against Water and Moisture

- Cover the intake silencer, exhaust pipe, etc. with vinyl sheets and seal them to prevent moisture from entering.
- Drain bilge in the hull bottom completely.
- Water may leak into the boat when it is moored, and whenever possible it should be landed.
- Waterproof the engine room to prevent rain and seawater from entering.

(5) Maintaining the Battery Charge

- Be sure to turn off the battery switch.

  During long-term storage, charge the battery once a month to compensate for the battery's self-discharge.

4.9.2 Checking the Engine for Reuse After a Long Storage Period

When using the engine after a long period of storage, prepare for operation in the same manner as for a new engine.

→See [3. BEFORE OPERATION]

5. MAINTENANCE and INSPECTION

Conduct Periodic Inspection for Your Safety.

The functions of engine components will degenerate and engine performance will fall according to the use of the engine. If countermeasures are not taken, you may encounter unexpected troubles while cruising at sea. Consumption of fuel or lube oil may become excessive and exhaust gas and engine noise may increase. These all shorten the life of the engine.
Daily and periodic inspection and servicing increase your safety operation.

Inspect Before Starting.

Make it a daily rule to inspect before starting. →See [4.1 Inspection Before Starting]

Monitor the hour meter and conduct periodic inspections.

Keep a daily record of operation and maintenance. When the time for an inspection approaches, study the relevant pages in the Operation Manual. Inspections should be made after every 50, 125 (6 mos.), 250(1 yr.), 500 (2 yrs.), 1000(4 yrs.), and 1250 (5 yrs.) hours of use.

Use Genuine YANMAR Parts.

Be sure to use genuine YANMAR parts for consumable and replacement parts. Use of other parts will reduce engine performance and shorten the life of the engine.
Specialty technicians are ready to assist you with periodic inspections and maintenance.
Consult your YANMAR dealer or distributor in accordance with the service agreement.

Always Have Servicing Tools On Hand.

Keep servicing tools close to the machinery and ready for use in inspections.

Tightening Torque of Bolts & Nuts.

It is important to tighten bolts and nuts properly to the correct tightening torque. Over-tightening damages the threads of the bolts and nuts and ruins them. Insufficient tightening causes oil leakage from the installation face or damage to parts. Important parts must be tightened with a torque wrench to the correct tightening torque and in the right order.
Consult with your dealer or distributor if servicing requires the removal of parts.

The tightening torque for standard nuts & bolts is listed below:

[NOTICE]

- ● Apply the following tightening torque to bolts having "7" on the head. (JIS strength classification : 7T)

- ○ Tighten bolts with no "7" mark to 60% tightening torque.
- ○ If the parts to be tightened are made from aluminum alloy, tighten the bolts to 80% tightening torque.

Bolt dia. x pitch	mm	M6x1.0	M8x1.25	M10x1.5	M12x1.75	M14x1.5	M16x1.5
Tightening torque	N·m (Kgf-m)	10.8±1.0 (1.1±0.1)	25.5±2.9 (2.6±0.3)	49.0±4.9 (5.0±0.5)	88.3±9.8 (9.0±1.0)	137±9.8 (14.0±1.0)	226±9.8 (23.0±1.0)

5.1 Periodic Inspections

Daily and periodic inspection are important to keep the engine in its best condition. The following is a summary of inspection and servicing items by inspection interval. Periodic inspection intervals vary depending on the uses, loads, fuels and lube oils used and handling conditions, and are hard to establish definitively. The following should be treated only as a general standard.

[NOTICE]

Schedule your own periodic inspection plan according to the operational conditions of your engine and inspect every item. Neglecting periodic inspection leads to engine troubles and shortens the life of the engine.
Refer to the various accompanying operation manuals for periodic inspection and maintenance for marine drive and remote control system.

○: Check ◎: Replace ●: Consult nearest dealer

Item	Content	Daily	Interval term					
			Every 50hrs	Every 125hrs (6 mos.)	Every 250hrs (1 yr.)	Every 500hrs (2 yrs.)	Every 1,000hrs (4 yrs.)	Every 1,250hrs (5 yrs.)
Fuel oil	Check of fuel level	○						
	Drain fuel tank		○					
	Drain fuel filter		○					
	Replace fuel filter				◎			
Lube oil	Check oil level	○						
	Replace engine oil		1st time ◎	2nd time & after ◎				
	Replace oil filter		1st time ◎	2nd time & after ◎				
	Wash engine oil cooler							●
Drive oil	Check drive oil	○	Refer to operation manual of marine drive.					
	Check power steering oil	○						
	Check power trim oil	○						
	Replace drive oil							
Fresh cooling water system	Check fresh water level, re-fill fresh water.	○						
	Replace the fresh cooling water				◎			
	Clean & check cooling water passage							●
Seawater cooling water system	Check seawater discharge	○						
	Check & replace impeller of seawater pump						●	
	Check & replace anti corrosive zincs				◎			
	Clean & check seawater passage							●
Piping	Check & replace fuel oil pipe, cooling water pipe	○				●		
	Check and replace mixing elbow.	○				●		
Electrical equipment	Check alarm lamps & devices	○						
	Check & supply electrolyte in battery		○					
Belt	Check alternator, V-belt, replacing if necessary					○		
	Replace timing belt							●
Remote control handle	Check remote control operation & grease	○						
	Adjusting the remote control cable				○			
Intake and exhaust system	Wash turbocharger blower				○			
	Adjust the intake and exhaust valve clearance				1st time ●		after ●	
	Lapping the intake and exhaust valve						●	
Fuel injection	Check & adjust the of fuel injection pressure & atomizing condition				1st time ●		after ●	
	Check & adjust of the fuel injection timing						●	

EPA Requirement in USA only

5.1.1 Inspection and Maintenance of Emission-Related Parts

Parts	Interval
Check fuel injection nozzle (cleaning)	1500 hours
Check fuel injection nozzle (adjustment)	3000 hours
Check fuel injection pump (adjustment)	
Check turbocharger (adjustment)	

Note: The inspection and maintenance items shown above are to be performed at your Yanmar dealer or distributor.

5.2 Periodic Inspection Items

5.2.1 Inspection After Initial 50Hrs. Operation

(1) Replacing the Engine Oil and Engine Oil Filter (1st time)

⚠ CAUTION

Precautions for Removing Hot Oil to Prevent Burns

If extracting oil from the engine while it is still hot, do not let the oil splash on you.

During initial operation of the engine, the oil is quickly contaminated due to the initial wear of internal parts. The engine oil must therefore be replaced early. Replace the engine oil filter, too, at this time.

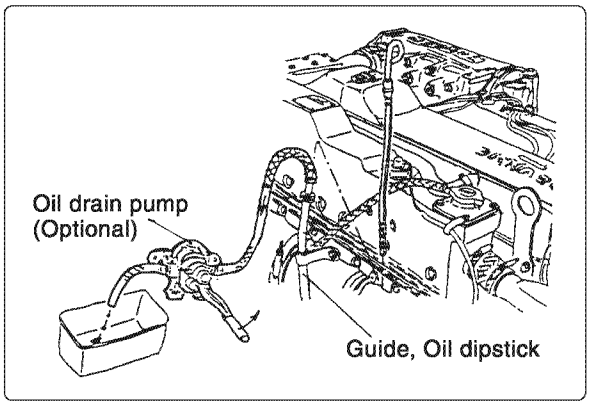
1) Drain off the engine oil.

Engine oil is convenient to drain before the engine has cooled down.

① After removing the oil dipstick, attach the hose of the oil drain pump (optional) to the dipstick guide.

② Prepare a container to receive drain oil and the oil with the oil drain pump.

③ Pump out remove the drain plug at the bottom of the engine oil cooler and drain off the oil inside.



2) Replace the engine oil filter.

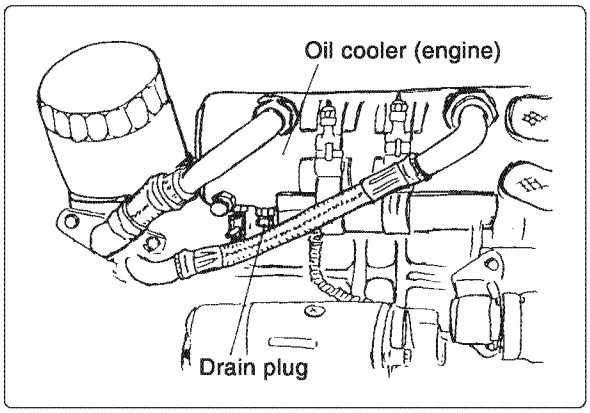
① Remove the engine oil filter with the filter wrench. (Turn counter-clockwise)

② Clean the filter installation face and apply a little of engine oil there.

③ Put on the new filter, turning it clockwise by hand and tighten an additional 3/4 of a turn with the filter wrench.

Part Numbers:

Engine oil filter 119770-90620



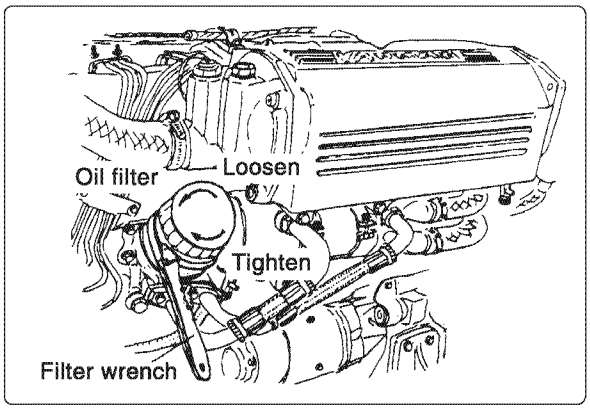
3) Supply new engine oil.

① Supply new engine oil to the specified level.

→See 3.3

② Run the engine for approximately 5 minutes and check that no oil leaks out during operation.

③ Wait approximately 10 minutes after stopping the engine. Check the oil level again with the oil dipstick and add to the specified level.

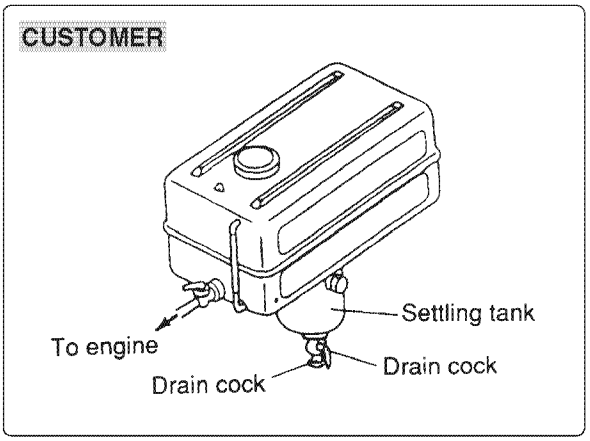


5.2.2 Inspection Every 50 Hours

(1) Draining of the Fuel Tank

①Open the drain cock of the fuel tank to drain (water, dust, etc.) from the tank bottom.

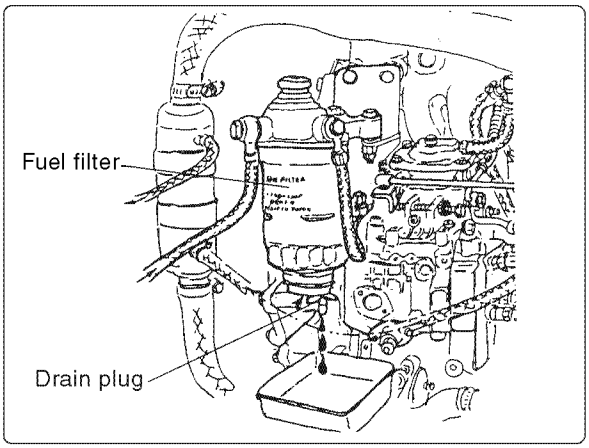
②Receive the drain in a container.
Drain until fuel with no water and dust flows out. Then close the drain cock.



(2) Drain the fuel filter

When water and dirt mixed with the fuel, it becomes impossible for the fuel injection pump and the valve to work. Drain periodically to keep the filter from becoming clogged. When there is a lot of drain collected in the oil/water separator at the bottom of the fuel filter, the fuel filter alarm lamp will light up. When there is a heavydeposit, drain the fuel tank at the same time.

①Loosen the drainplug at the bottom of the fuel filter and drain off any water and dirt collected inside.
②Retighten the drainplug.
③Be sure to bleed air from the fuel system.
→ **See 3.2.2.**



(3) Inspection of Battery

⚠ WARNING

Fire due to Electric Short-Circuits

Always turn off the battery switch or detach the earth cable (-) before inspecting the electrical system. Failure to do so could cause short-circuiting and fires.

Proper Ventilation of the Battery Area

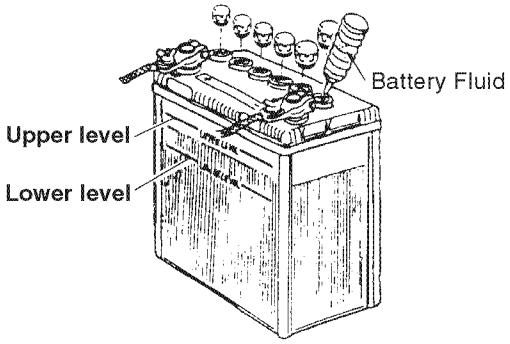
Be sure the area around the battery is well-ventilated and there is nothing which could start a fire. During operation and charging, hydrogen gas is emitted from the battery and can be easily ignited.

Battery Fluid

Battery fluid is diluted sulfuric acid. It can blind you if it gets in your eyes, or burn your skin. Keep the fluid away from your body. Wash it off immediately with a large quantity of fresh water if you get any on you.

- Check the level of fluid in the battery. When the amount of fluid nears the lower limit, fill with battery fluid (available in the market) to the upper limit. If operation continues with insufficient battery fluid, the battery life is shortened, and the battery may overheat and explode.
- Battery fluid tends to evaporate more quickly in the summer, and the fluid level should be checked earlier than the specified times.
- If the engine cranking speed is so slow that the engine does not start up recharge the battery.
- If the engine still will not start after charging, replace the battery.

CUSTOMER



Follow the instructions and precautions in the manual from the battery maker.

[NOTICE]

The capacity of the specified alternator and battery is sufficient for regular operation, however, the capacity may be insufficient, if they are used for other purposes such as lights inside the boat, etc. Consult your YANMAR dealer or distributor.

5.2.3 Inspection Every 125 Hours or 6 mos.

Replacing the Engine Oil and Lube Oil Filter (2nd time & after)

After the initial oil change, the engine oil should be replaced after every 125 hours.
Replace the engine oil filter at the same time. **→See 5.2.1(1)**

5.2.4 Inspection Every 250 Hrs. or 1 yr.

(1) Replacing the Fuel Filter

Replace the fuel filter periodically before there is clogging and the fuel flow is reduced.

① Close the fuel cock of the fuel tank.

② Drain the fuel from the fuel drain cock at the bottom of fuel filter. See. 5.2.2(2)

③ Remove the connectors of the wiring and remove the alarm switch using spanner.

④ Remove the fuel filter using filter wrench.

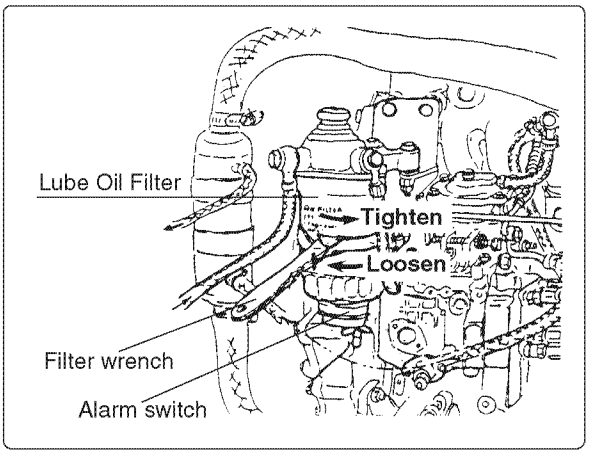
⑤ Tighten the new fuel filter. (Clean the fuel filter installing surface).

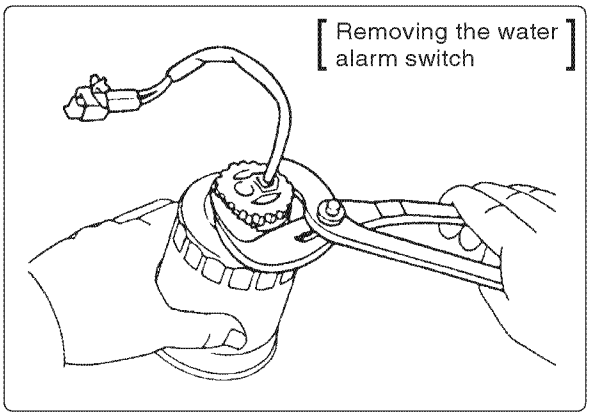
Part No. of the fuel filter: 119773-55710

- Install the alarm switch to the new fuel filter.
- Apply fuel to the gasket of the new fuel filter.
- Lightly screw in the fuel filter in position and tighten it until the gasket comes into contact with the seat.
- Manually tighten the filter by a 3/4 turn. [tightening torque: 14.7~19.6 N·m(1.5~2.0 kgf·m)]
- Connect the alarm switch wiring.

⑥ Fill fuel to the fuel filter. (See 3.2.2)

- If you spill fuel, wipe such spillage carefully.
- Start the engine to check for fuel leakage.





(2) Replacing Cooling Water

Cooling performance drops when the cooling water is contaminated with rust and scale.
Even if long life coolant (LLC) is added, the cooling water must be periodically replaced because the properties of the agent will degenerate. Replace the cooling water periodically.

- Draining the Cooling Water → **See 4.9.1(2).**
- Supplying Cooling Water → **See 3.5**

(3) Inspecting and Replacing Anti-Corrosive Zinc

Inspect and replace the anti-corrosive zinc periodically.

①Close the kingston cock.

②Drain the cooling seawater.

→ **See 4.9.1(2)**

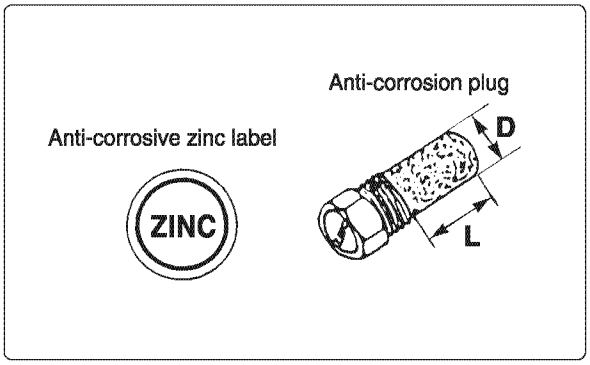
③Remove the plug labeled ZINC and indicated in the figure.

Anti-corrosive zinc is on the following parts.

Part	Parts No.	Quantity	Dimensions D×L
Intercooler	119574-18790	1	1/2″×1″
Engine oil cooler	119574-44150	2	1/2″×1″
Fresh water cooler	119574-44150	2	1/2″×2″

[NOTICE]

If replacement of zinc is neglected and operation is continued with a small volume of anti-corrosive zinc, corrosion of the seawater cooling system will occur and water leakage, parts breakage, or accidents will result.

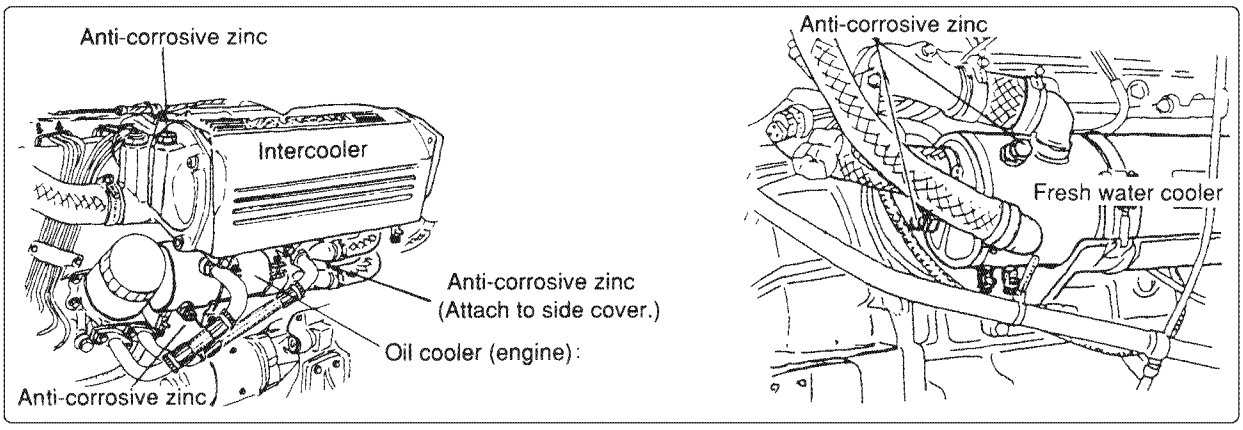


④Check the zinc on the inside of the plug to determine the amount of wear to the anti-corrosive zinc.

- Replace the anti-corrosive zinc when it has been reduced to less than 1/2 of its original size.
- If there is only a little bit of wear, clean the surface by sanding off any corroded areas.

⑤Replace plug with new one.

⑥Open the kingston cock and check water leakage.



[NOTICE]

Check the zinc for marine drive (marin CTP gear) in accordance with their accompanying operation manuals.

(4) Adjusting the Governor Remote Control Cable

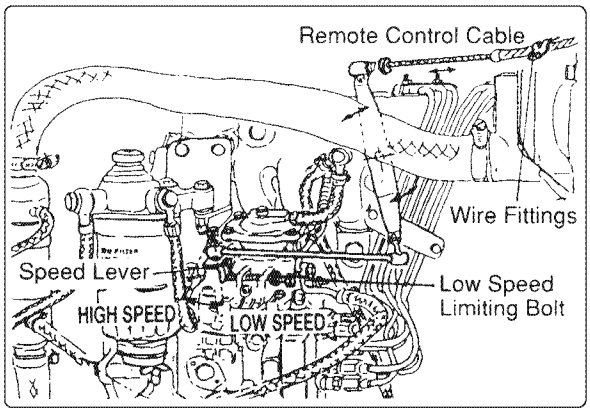
The governor remote control handle and the engine speed levers are connected by an accelerator cable. Over time the cable becomes stretched and the connections loose causing deviation in the position which makes operation unsafe. Inspect the cable periodically and adjust if necessary.

①Check to see that the speed lever on the engine side is touching the high speed limiting bolt when the governor handle is put in **H** (High Speed).
High speed limiting bolt locates in back of the fuel injection pump.

②Check to see that the speed lever on the engine side is touching the low speed limiting bolt when the governor handle is put in **L** (Low Speed).

③If the speed lever does not touch the limiting bolt for either the high or low speed when you check them, loosen the setting bolts on the fittings for the accelerator cable and adjust the position of the cable.
After adjusting the cable, retighten the setting bolts.

【NOTICE】
Never remove the limiting bolt for the fuel injection pump or the restraint bolt on the amount of fuel injected. Doing so will impair safe operation and lower the efficiency of the engine and shorten its life.



(5) Adjusting the Clutch Remote Control Cable for the Marine Drive

①Check to see that the clutch lever on the marine gear side is in the neutral position when the remote control handle is in **NEUTRAL.**
②If the position of the clutch lever is incorrect, loosen the setting screw of the cable bracket and adjust the position of the cable.
③Check the clutch lever in
▲**FWD** (Forward) (Ahead)
▼**REV** (Reverse) (Astern)
making sure it is correctly aligned.
④Make any necessary adjustments using **NEUTRAL** as the central point.
⑤Make sure the control cable is securely fastened to the clutch lever.
For other models, refer to the marine gear operation manual.

For other models, check and adjust the marine drive and remote control handle in accordance with their accompanying operation manuals making sure the clutch positions are correct.

(6) Washing the Turbocharger Blower

①Prepare blower cleaning agent, fresh water and a small pitcher.

Blower Wash (4L)

Part No. : 974500-00400

②Remove the pre-cleaner (filter) of the turbocharger air inlet.

③Open the drain cock at the bottom of the intercooler and drain.

④Pour about 50cc of blower cleaning agent little by little at about 10 second intervals through the air inlet under no load operation (2500~3000 rpm)

⑤Wait about 3 minutes, and pour 50cc fresh water into the air inlet in the same manner at about 10 second intervals.

⑥Run the engine at load for about 10 min to dry the turbocharger and check that engine output has recovered. If the out-put has not recovered, repeat the above cleaning cycle 3 or 4 times.

If the output still has not recovered, consult your YANMAR dealer or distributor.

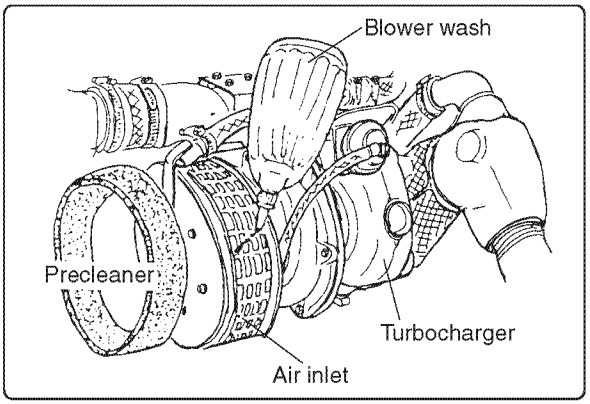
⑦Clean the pre-cleaner with detergent, dry it and install it to the blower air inlet.

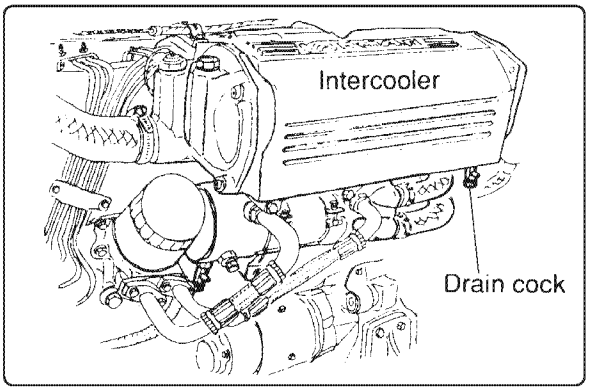
Replace the pre-cleaner (filter), if broken.

⑧Stop the engine and retighten the drain cock.

[NOTICE]

Do not pour a large quantity of blower cleaning agent or fresh water in at once. The blower may be broken or water-hammer may occur.





(7) Adjustment of Intake/Exhaust Valve Clearamce (Initial)

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor. Adjustment is necessary to maintain the correct timing for the opening and closing of valves. Neglecting adjustment will cause the engine to run noisily and result in reduced power output and other damage.

(8) Inspecting and Adjusting Fuel Injection Valves(Initial)

This maintenance requires specialized knowledge. Consult your YAMNMAR dealer or distributor. Fuel injection should be adjusted to ensure good engine performance.

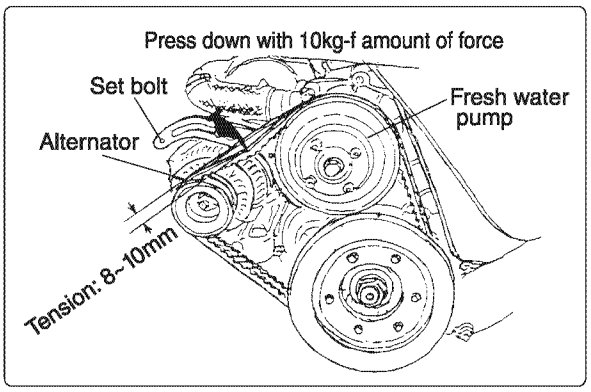
5.2.5 Inspection Every 500 Hrs. or 2 yrs.

(1) Checking the Tension of the V-Belt of the Alternator

When there is not enough tension in the V-belt, the belt will slip making it impossible for the alternator to generate power.
Additionally, the fresh water pump will not work causing the engine to overheat.
Check the tension of the V-belt in the following manner.

①Press the V-belt down with your thumb at the middle of the belt to check the tension. The give in the V-belt should measure about 8～10mm at the depression.
②To adjust the V-belt tension, loosen the set bolt and move the alternator.
③Replace the belt if it is damaged.
Parts No: 119775-77260 (2-belts)

[NOTICE]
- **If the V-belt tension is too tight, the belt and the bearings of the alternator will be damaged.**
- **Be careful not to spill any oil on the V-belt as this will lead to stretching and slippage.**

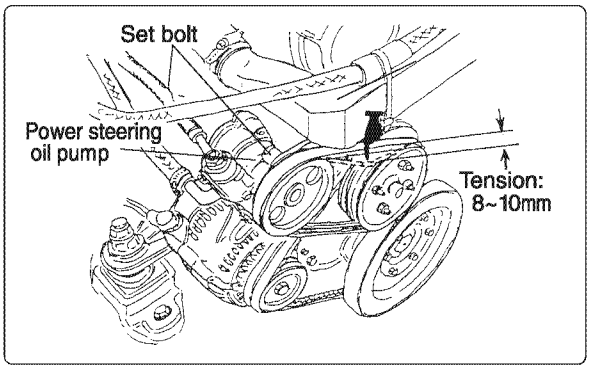


(2) Checking the Tension of the Belt of the Power Steering Oil Pump

6LPA-STZP2

When there is not enough tension in the belt, the oil pump will not turn making steering impossible and operation dangerous.
Check the tension of the belt in the following manner.

①Press the belt down with your thumb at the middle of the belt to check the tension.
The give in the belt should measure about 8~10mm at the depression.
②To adjust the belt tension, loosen the set bolt and move the oil pump.
③Replace the belt if it is damaged. **Parts No: 119787-26540**



(3) Checking and Replacing the fuel pipe and the cooling water pipe

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
Check the hoses of the fuel and cooling water pipings and replace if damaged.

(4) Replacing the Mixing Elbow

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
The mixing elbows which are constantly in contact with exhaust gas and seawater deteriorate with use and must be replaced. If operation is continued without replacing faulty elbows, water will leak into the boat, and gas leakage may result in fires.

5.2.6 Inspection Every 1000 Hrs. or 4 yrs.

(1) Inspecting Inner Parts of the Seawater Pump

The inside parts of the seawater pump will deteriorate with use, and discharge performance falls. At the specified interval or when the discharge volume of seawater is reduced, inspect the seawater pump in accordance with the following procedures.

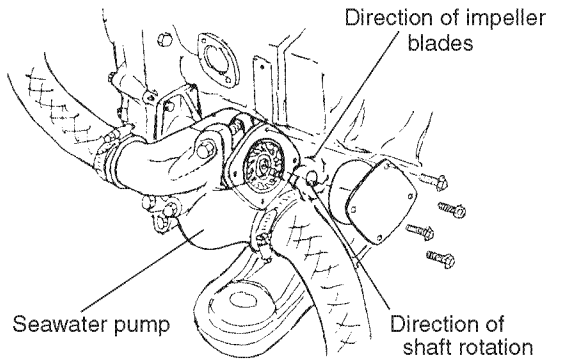
→ See 4.9.1(2)

①Loosen the side cover set bolts (4) and remove the side cover.

②Illuminate the inside of the seawater pump with a flashlight and inspect. If any of the following problems are found, disassembly and maintenance are necessary.

- Impeller blades are cracked or nicked. Edges or surfaces of the blades are marred or worn. The impeller must be replaced periodically every 2000 hrs.
- Wear plate is damaged.

③If no damage is found when inspecting the inside of the pump, replace the side cover. Fit the O-ring to the groove of the joint face before replacing the side cover.



[NOTICE]

- **When the impeller has been disassembled, be careful to replace it so that it moves in the correct direction. The seawater pump turns clockwise, however, the impeller blades turn counterclockwise.**
- **When turning the engine by hand, be sure to turn it in the correct direction. Turning it in the opposite direction damages the blades of the impeller.**

If water leaks continuously from the water drain pipe beneath the seawater pump during operation, disassembly and maintenance (replacement of the mechanical seal) are necessary.
When disassembly and maintenance of the seawater pump are necessary, consult your YANMAR dealer or distributor.

(2) Adjustment of Intake / Exhaust Valve Clearance (2nd time & after)

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
Adjustment is necessary to maintain the correct timing for the opening and closing of valves.
Neglecting adjustment will cause the engine to run noisily and result in reduced power output and other damage.

(3) Inspecting and Adjusting Fuel Injection Valves (2nd time & after)

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
Fuel injection must be adjusted to ensure good engine performance.

(4) Lapping of Intake/Exhaust Valves

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
Adjustment is necessary to maintain proper contact of the valves and seats.

(5) Checking and Adjusting the Fuel Injection Timing

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
Fuel injection timing must be adjusted to ensure optimal engine performance.

5.2.7 Inspection Every 1250 Hrs. or 5 yrs.

(1) Washing the Cooling Water System and Checking and Maintaining Parts

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
Over time rust and scale builds up in the seawater and fresh water systems reducing their cooling performance. Additionally, when the inside of the engine oil cooler and the clutch oil cooler become dirty, lube oil cooling worsens causing the oil to deteriorate more quickly.
Wash the following related parts when the cooling water is being replaced.
Cooling water system related parts: seawater pump, engine oil cooler, intercooler, clutch oil cooler, fresh water pump, fresh water cooler, thermostat, etc.

(2) Replace the Timing Belt

This maintenance requires specialized knowledge. Consult your YANMAR dealer or distributor.
A loose or damaged belt will cause major accidents. Check for damage or looseness.

6. TROUBLE AND TROUBLESHOOTING

6.1 Simple problems and the appropriate countermeasures

If you should encounter some difficulty during operation, refer to the following table for countermeasures.

Trouble	Probable Cause	Measure	Reference
Problem occurs during operation. ■Alarm buzzer sounds and alarm lamps come on.	**[NOTICE]** **When the alarm equipment indicates a problem, immediately put the clutch in neutral and run the engine at low speed. Check to see which alarm indicator is lit, then stop the engine and inspect. When you cannot determine the source of the problem, return to port at low speed and ask your Yanmar dealer for repairs.**		
●Charge Lamp (Alarm buzzer does not sound.)	Faulty battery V-belt is loose or damaged Alternator is not generating electricity	Check battery fluid. Adjust V-belt tension or replace belt. Ask for repairs.	5.2.2(3) 5.2.5(1)
●C.W. Temp. Lamp goes on.	Insufficient cooling water in fresh water tank Leakage in fresh water cooling system Fresh water cooling pump is damaged Inside of C.W. system is dirty.	Check and replenish cooling water. Ask for repairs for water leakage. Ask for repairs. Ask for repairs.	3.5
●L.O. Press. Alarm Lamp goes on.	Insufficient engine oil	Replenish engine oil.	3.3
●C.W. Level Alarm Lamp goes on.	Insufficient cooling water in fresh water tank	Check and replenish fresh cooling water.	4.1(5)
●Gear Oil Alarm Lamp goes on.	Insufficient drive oil	Replenish drive oil.	3.4
●Fuel Filter Alarm Lamp goes on.	Increased fuel filter drain	Drain water separator.	5.2.2(2)
●Exhaust Alarm Lamp goes on.	Insufficient discharge of cooling seawater Damaged cooling seawater pump	Kingston cock is closed. Kingston cock is clogged. Suction hose is damaged or joints loose Check seawater pump impeller.	 5.2.6(1)
Faulty Alarm Devices	**[NOTICE]** **Do not operate the engine if alarm devices are not working properly. Serious accidents may result if difficulties are not spotted due to faulty alarm lamps.**		
■Before starting when switch is turned from **OFF→ON**, alarm devices do not work.			2.5.1(2)
●Alarm buzzer does not sound.	Circuit broken or buzzer damaged	Ask for repairs.	
●Some alarm lamps do not light up.	Circuit broken or lamp burnt out.	Ask for repairs.	
■After starting when switch returns from **START →ON**, alarm devices do not work.			2.5.1(2)
●Alarm buzzer does not stop.	Short circuit	Ask for repairs.	
●Some alarm lamps do not go out.	Damaged sensor or switch	Ask for repairs.	

Trouble	Probable Cause	Measure	Reference
■ Starting Failures			
●Starter works. but engine does not start	No fuel Air in fuel line Bad fuel Clogged fuel filter Poor fuel injection Pressure leakage from intake/exhaust valves	Replenish fuel; bleed. Bleed. Replace with recommended fuel. Replace fuel filter. Ask for repairs. Ask for repairs.	3.2 3.2.2 3.1.1 5.2.4(1)
●Starter does not turn or turns too slowly (engine can be turned manually)	Insufficient battery charge Faulty cable connection at buttery terminals Faulty starter switch Faulty starter	Check battery fluid, recharge. Remove rust from terminals; retighten Ask for repairs. Ask for repairs.	5.2.2(3)
●Cannot be turned manually.	Inner parts seized or damaged	Ask for repairs.	
■ Poor exhaust color			
●Black smoke emitted.	Overload Improper fuel Boost pressure low Faulty spraying of F.O. injection Excessive intake/exhaust valve clearance	Reduce load. Replace with recommended fuel. Wash turbocharger blower. Ask for repairs. Ask for repairs.	 3.1.1 5.2.4(6)
●White smoke emitted.	Improper fuel Faulty spraying of F.O. injection Fuel injection timing delay Lube oil burns/excessive consumption	Replace with recommended fuel. Ask for repairs. Ask for repairs. Ask for repairs.	3.1.1

6.2 Consulting Your YANMAR Dealer or Distributor

Refer difficult problems and repairs to your dealer or distributor.
At the time of trouble, check and report the following.

①Engine model and number (For engine name plate, see 2.3 [Names of Parts].
②Boat name, hull material, boat size (tons)
③Use, type of work, no. of hours run
④Total no. of operation hours (refer to hour meter), age of machine
If there is no hour meter, use number of hours per day × number of days and amount of fuel used.
⑤Condition immediately before trouble (engine rpm, type of operation, load condition, etc.)
⑥Details of trouble
(exhaust color, sound of engine, does engine start, can engine be turned manually, type of fuel used, brand and viscosity of lube oil, etc.)
⑦Past problems and repairs.

We will need the following information in order to assist you:

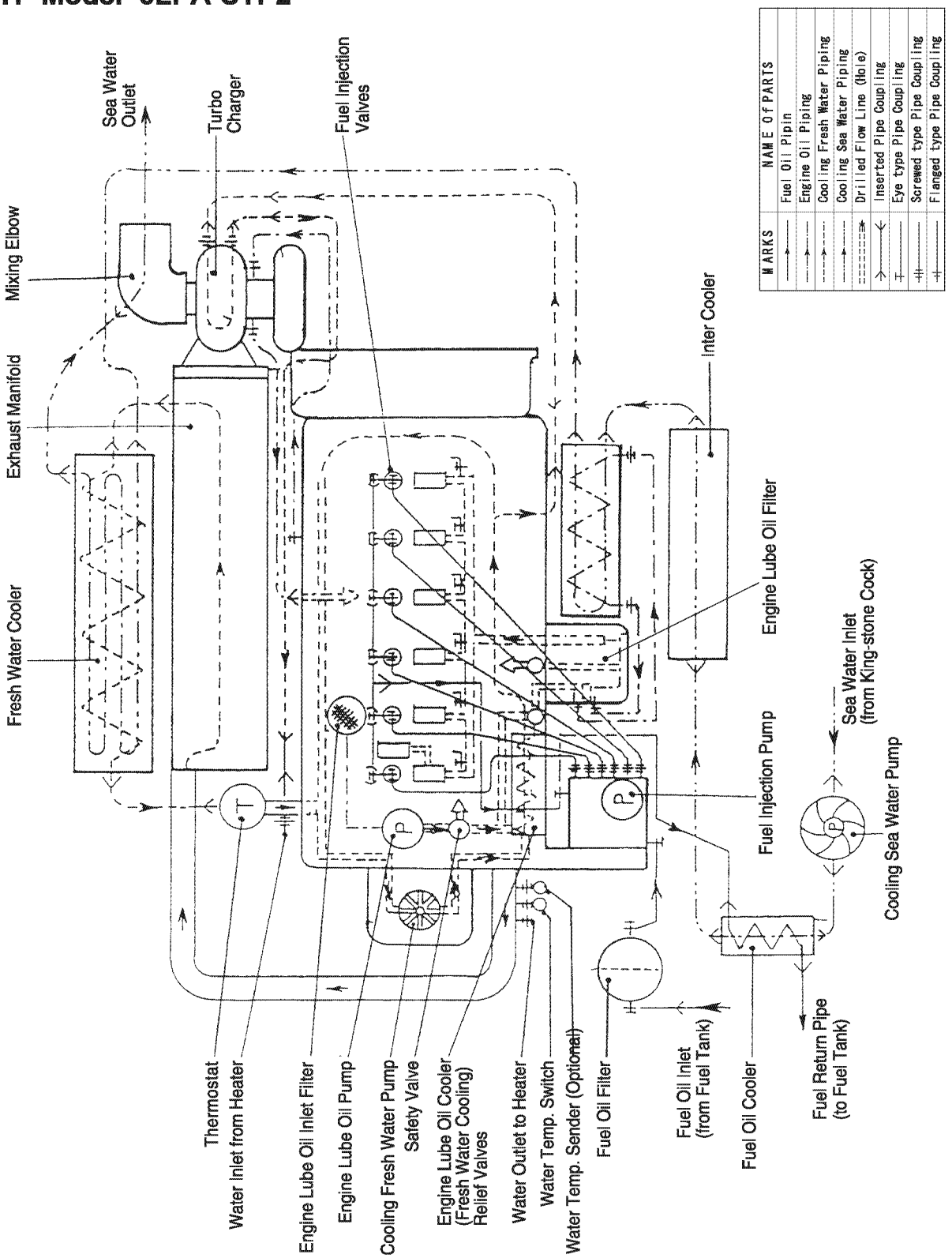
- Your name, address and telephone number
- Product model and serial number
- Date of purchase
- Dealer name and address
- Nature of problem

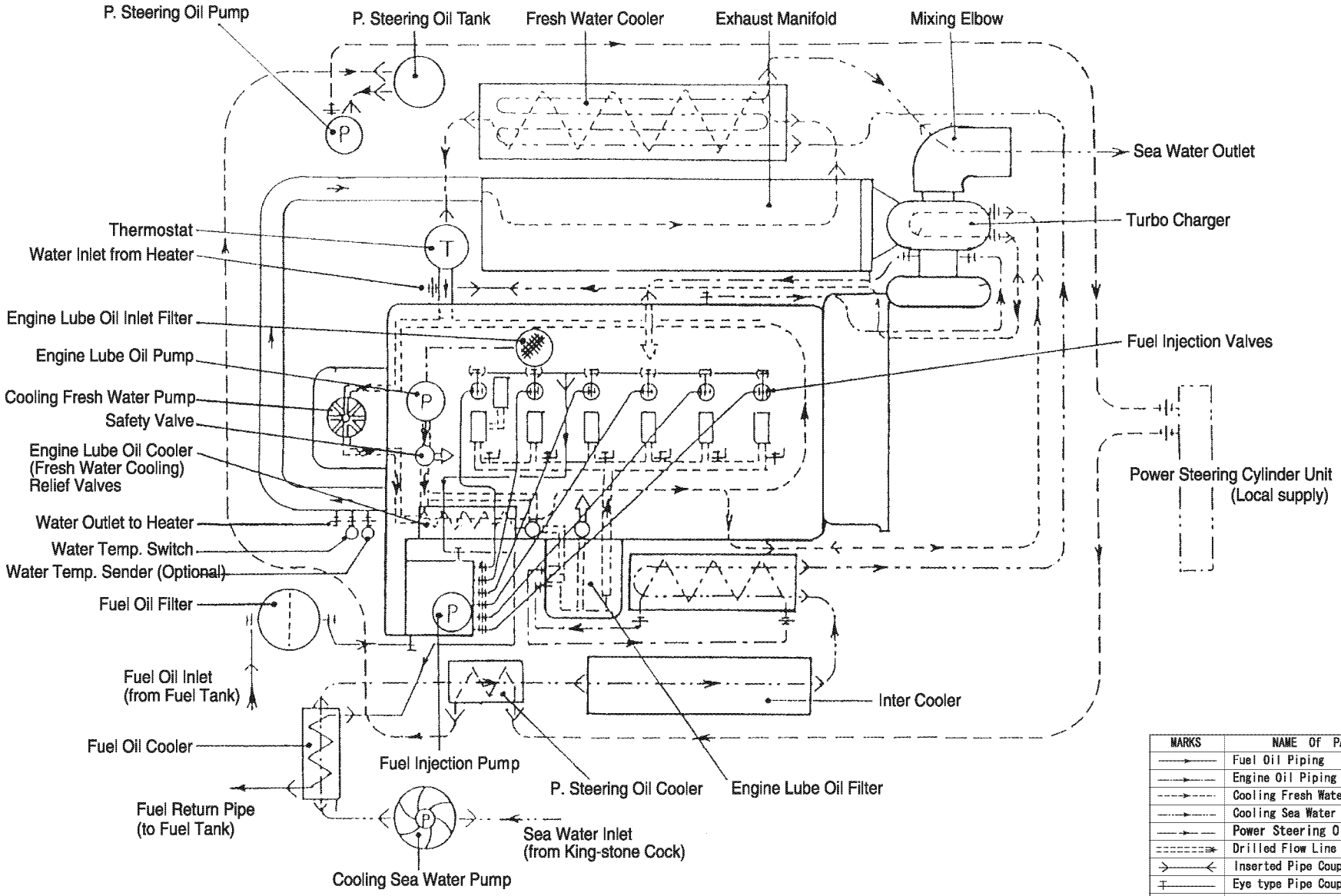
After reviewing all the facts involved, you will be advised of what action can be taken.
Please bear in mind that your problem will likely be resolved at the dealership, using the dealer's facilities, equipment and personnel, so it is very important that your initial contact will be with the dealer.

7. SYSTEM DIAGRAMS

7.1 Piping Diagram
(Fuel Oil, Engine Lube Oil, Cooling Water System)

7.1.1 Model 6LPA-STP2





MARKS	NAME OF PARTS
	Fuel Oil Piping
	Engine Oil Piping
	Cooling Fresh Water Piping
	Cooling Sea Water Piping
	Power Steering Oil Piping
	Drilled Flow Line (Hole)
	Inserted Pipe Coupling
	Eye type Pipe Coupling
	Screwed type Pipe Coupling
	Flanged type Pipe Coupling

7.2.1 For B-type Control Panel

Engine Harness

R	Red
B	Black
W	White
L	Blue
RB	Red / Black
LB	Blue / Black
YW	Yellow / White
YB	Yellow / Black
YG	Yellow / Green
WL	White / Blue
WB	White / Black
WR(RW)	White/Red (Red/White)
WG(GW)	White/Green (Green/White)
GB	Green / Black
YR	Yellow / Red
GR(RG)	Green/Red (Red/Green)
O	Orange
BrW	Brown / White
WBr	White / Brown
LW	Blue / White
Y	Yellow

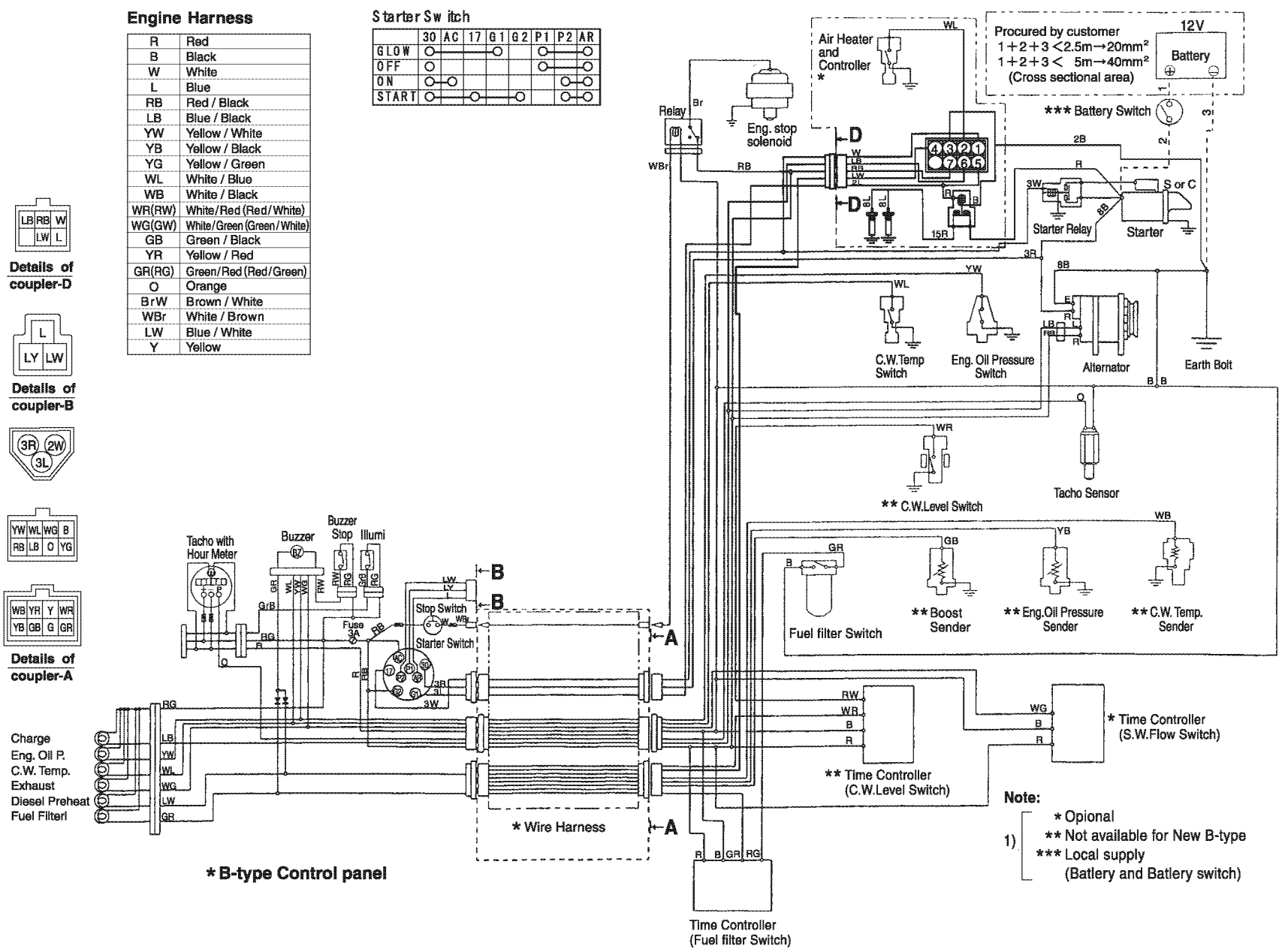
Starter Switch

	30	AC	17	G1	G2	P1	P2	AR
GLOW	○			○		○	○	○
OFF	○					○		○
ON	○	○					○	○
START	○		○		○		○	○

Details of coupler-D

Details of coupler-B

Details of coupler-A

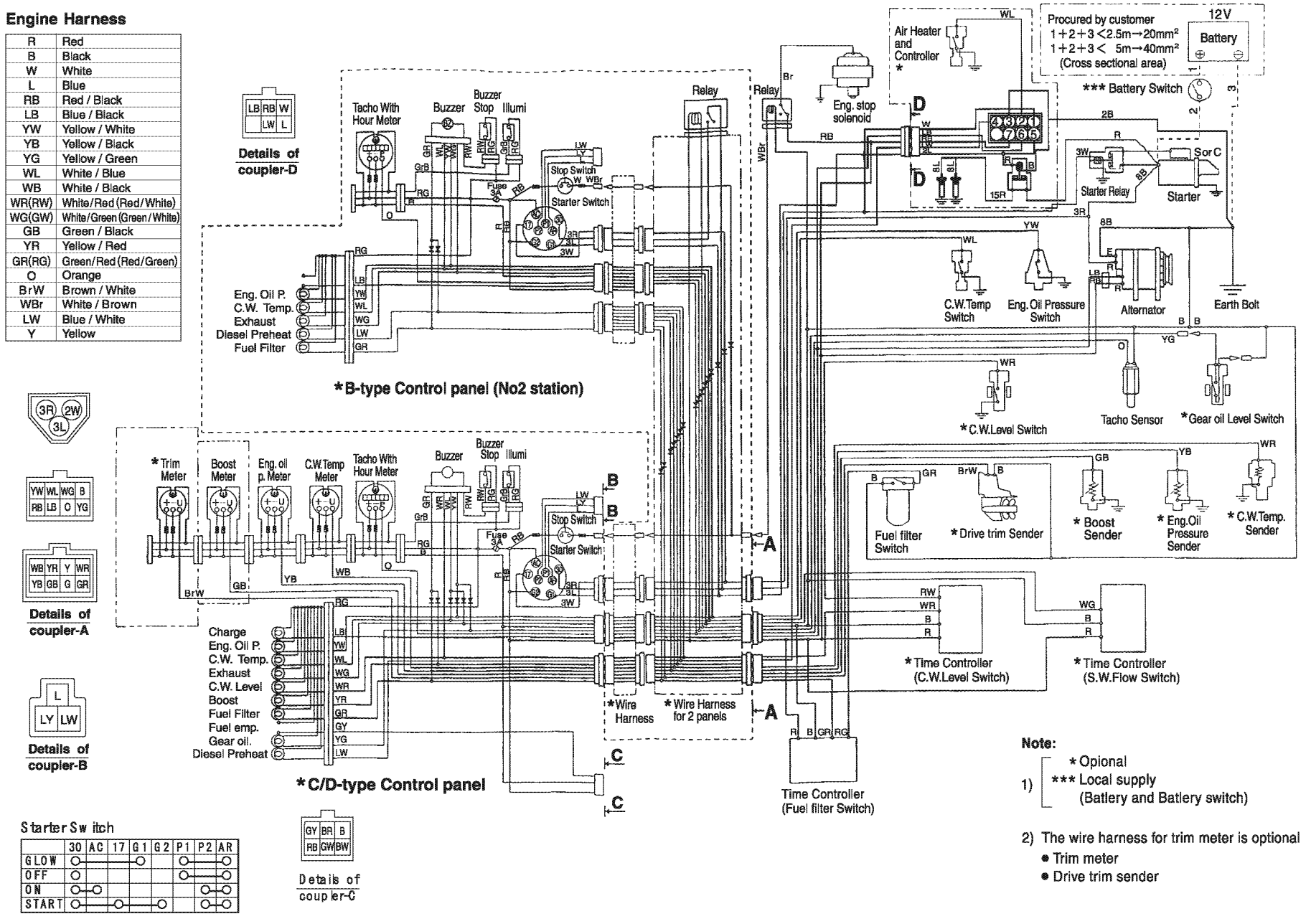


Note:

1) * Opional
** Not available for New B-type
*** Local supply
(Batlery and Batlery switch)

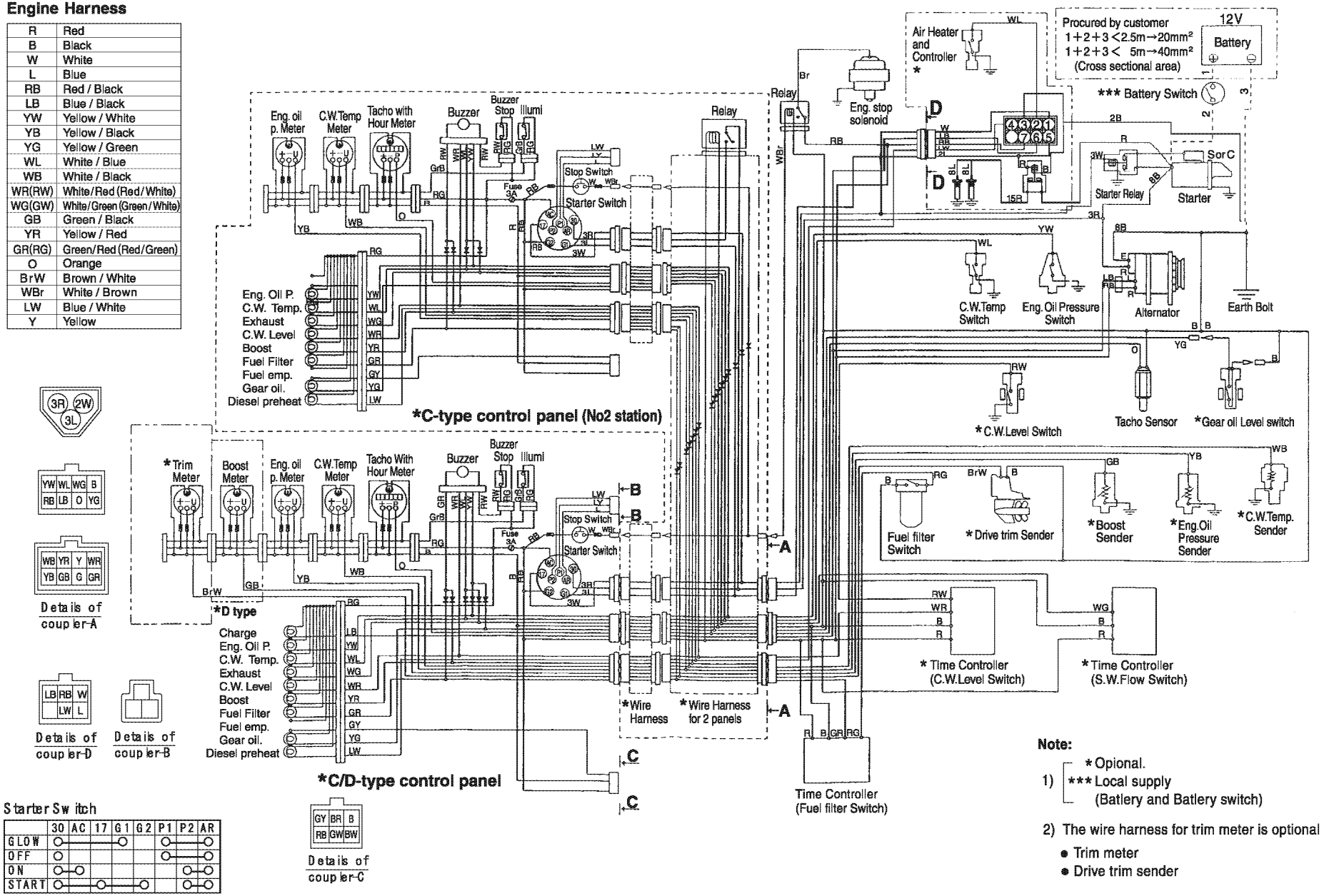
Engine Harness

R	Red
B	Black
W	White
L	Blue
RB	Red / Black
LB	Blue / Black
YW	Yellow / White
YB	Yellow / Black
YG	Yellow / Green
WL	White / Blue
WB	White / Black
WR(RW)	White/Red (Red/White)
WG(GW)	White/Green (Green/White)
GB	Green / Black
YR	Yellow / Red
GR(RG)	Green/Red (Red/Green)
O	Orange
BrW	Brown / White
WBr	White / Brown
LW	Blue / White
Y	Yellow



Engine Harness

R	Red
B	Black
W	White
L	Blue
RB	Red / Black
LB	Blue / Black
YW	Yellow / White
YB	Yellow / Black
YG	Yellow / Green
WL	White / Blue
WB	White / Black
WR(RW)	White/Red (Red/White)
WG(GW)	White/Green (Green/White)
GB	Green / Black
YR	Yellow / Red
GR(RG)	Green/Red (Red/Green)
O	Orange
BrW	Brown / White
WBr	White / Brown
LW	Blue / White
Y	Yellow



Note:

1) * Opional.
   *** Local supply
   (Batlery and Batlery switch)

2) The wire harness for trim meter is optional
   - Trim meter
   - Drive trim sender

Starter Switch

	30	AC	17	G1	G2	P1	P2	AR
GLOW	○			○		○		○
OFF	○					○		○
ON	○	○					○	○
START	○		○		○		○	○

8. EPA WARRANTY USA ONLY

8.1 Yanmar Co., Ltd. Limited Emission Control System Warranty - USA Only

The following EPA Warranty only applies to engines built on or after January 01, 2006 and labeled with the proper nameplate.

THIS EMISSION WARRANTY APPLIES TO THE ENGINES CERTIFIED TO UNITED STATES EPA 40 CFR 94 AND SOLD BY YANMAR THAT ARE INSTALLED IN VESSELS FLAGGED OR REGISTERED IN THE UNITED STATES.

8.1.1 Your Warranty Rights and Obligations:

Yanmar warrants to the first user and each subsequent purchaser the emission control system on your engine for periods of time listed below provided the engine has been installed according to Yanmar installation requirements and there has been no abuse, neglect, or improper maintenance of your Yanmar marine engine.

Yanmar warrants that the engine is designed, built and tested using genuine parts and equipped so as to conform to all applicable emission requirements of the U.S. Environmental Protection Agency and is free from defects in material and workmanship which would cause this engine to fail to conform to the applicable emission regulations over its limited emission control system warranty period.

Where a warrantable emissions condition exists, Yanmar will repair your engine at no charge to you for diagnosis, parts, and labor. Warranty service or repair will be provided at authorized Yanmar marine deals or distributors.

It is recommended that any replacement parts used for maintenance, repair or replacement of emission control systems are Yanmar parts. The owner may elect to have maintenance, replacement or repair of the emission control components and systems performed by any repair establishment or individual and may elect to use parts other than Yanmar parts for such maintenance, replacement or repair. However, the cost of such service or parts and subsequent failures from such service or parts will not be covered under this emission control system warranty:

8.1.2 Warranty Period:

The warranty starts on either the date of delivery to the first end-user, or the date the unit is first leased, rented, or loaned.

1. For Pleasure Use: The warranty period is **five (5) years** or **2000 hours** of use, whichever occurs first. In the absence of a device to measure hours of use, the engine has a warranty period of **five (5) years**.
2. For Commercial Use: The warranty period is **five (5) years** or **5000 hours** of use, whichever occurs first. In the absence of a device to measure hours of use, the engine has a warranty period of **five (5) years**.

8.1.3 Warranty Coverage:

Repair or replacement of any warranted parts will be performed at an authorized Yanmar dealer or distributor. This limited emission control system warranty covers engine components that are a part of the emission control system of the engine as delivered by Yanmar to the original retail purchaser. Such components may include the following:

1. Fuel Injection System
2. Turbocharger System
3. Aftercooler
4. Electronic Engine Control Units and its associated Sensor and Actuators

8.1.4 Exclusions:

Failures other than those arising from defects in material and / or workmanship are not covered by this limited emissions warranty. This warranty does not extend to the following: malfunction caused by abuse, misuse, improper adjustment, modification, alteration, tampering, disconnection, improper or inadequate maintenance, improper storage or use of non-recommended fuels and lubricating oils, accident-caused damage, and replacement of expendable and / or consumable items made in connection with scheduled maintenance.

8.1.5 Owner's Responsibility:

As the Yanmar marine engine owner, you are responsible for the performance of the required maintenance listed in your *Operation Manual*. Yanmar recommends that you retain all documentation, including receipts, covering maintenance on your marine engine, but Yanmar cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

Your engine is designed to operate on diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with applicable emission requirements. You are responsible for initiating the warranty process. You must present your marine engine to an authorized Yanmar dealer or distributor as soon as a problem exists.

8.1.6 Customer Assistance:

If you have any questions regarding your warranty rights and responsibilities or would like information on the nearest authorized Yanmar dealer or distributor, you should contact Yanmar Marine USA Corporation for assistance.

Yanmar Marine USA Corporation
101 International Parkway
Adairsville, GA 30103
USA
Telephone: 770-877-9894
Fax: 770-877-7567

Declaration of Conformity for Recreational Craft Propulsion Engine with the Exhaust emission requirements of Directive 94/25/EC as amended by 2003/44/EC

(To be completed by manufacturer of inboard engines without integral exhaust)

Name of engine manufacturer: Yanmar Co., Ltd.

Street: 1-32 **Town:** Chayamachi, Kitaku, Osaka-City

Post Code: 530-8311 **Country:** Japan

Name of Authorised Representative: Yanmar Marine International B.V.

Street: Brugplein 11 **Town:** Almere-de Vaart

Post Code: 1332 BS **Country:** The Netherlands

Name of Notified Body for exhaust emission assessment: Société Nationale de Certification et d'Homologation

Street: 11, route de Luxembourg **Town:** Sandweiler

Post Code: L-5230 **Country:** Luxembourg **ID Number:** 0499

Module used for exhaust emission assessment: ☐ B+C ☒ B+D ☐ B+E ☐ B+F ☐ G ☐ H

or engine type-approved according to: ☐ **stage II of Directive 97/68/EC** ☐ **Directive 88/77/EC**

Other Community Directives applied: 89/336/EEC

DESCRIPTION OF ENGINE(s) AND ESSENTIAL REQUIERMENTS

Engine Type:
- ☐ z or sterndrive without integral exhaust
- ☒ Inboard engine

Fuel Type:
- ☒ Diesel
- ☐ Petrol

Combustion cycle:
- ☐ 2 stroke
- ☒ 4 stroke

Essential requirements	Standards Used	Other normative document used	See technical file
Annex I.B – Exhaust Emissions			
engine identification			
exhaust emission requirements	EN ISO 8178-1:1996		x
durability			
owner's manual			
Annex I.C – Noise Emissions	see craft manufacturer's Declaration of Conformity		

ENGINE(S) COVERED BY THIS DECLARATION

Engine model(s) or engine family name(s):	EC Type certificate number (exhaust)
	SNCH*94/25*2003/44*
RCD-1GM10X1	0009*00
RCD-2YM15X1	0004*00
RCD-3YM30X1	0005*00
RCD-4JH4X1	0014*00
RCD-4JH3TX1	0011*01
RCD-4LHAX1	0015*00
RCD-6LPADX1	0012*00
RCD-6LPASX1	0007*00
RCD-6CXMX1	0006*00
RCD-6LY2X1	0008*00
RCD-6LY3X1	0010*00
RCD-4JH3TX2	0016*00
RCD-4JH4TX2	0017*00
RCD-4JH4TX1	0018*00

I declare on behalf of the engine manufacturer that the engine(s) will meet the exhaust emission requirements of Directive 94/25/EC as amended by Directive 2003/44/EC when installed in a recreational craft, in accordance with the engine manufacturer's supplied instructions and that this (these) engine(s) must not be put into service until the recreational craft into which it is (they are) to be installed has been declared in conformity with the relevant provisions of the above mentioned Directive.

Name: G. Mantel **Signature and title:**

(identification of the person empowered to sign on behalf of the engine manufacturer or his authorised representative)

(or an equivalent marking)

Date: (yr/month/day) 2005 / 10 / 21

Declaration of Conformity for Recreational Craft Propulsion Engine with the Exhaust and Noise emission requirements of Directive 94/25/EC as amended by 2003/44/EC

(To be completed by manufacturer of outboard or inboard engines with integral exhaust)

Name of engine manufacturer: Yanmar Co., Ltd.

Street: 1-32 **Town:** Chayamati, Kitaku, Osaka-City

Post Code: 530-8311 **Country:** Japan

Name of Authorised Representative (if applicable): Yanmar Marine International B.V.

Street: Brugplein 11 **Town:** Almere-de Vaart

Post Code: 1332 BS **Country:** The Netherlands

Name of Notified Body for exhaust emission assessment: Société National de Certification et d'Homologation

Street: 11, route de Luxembourg **Town:** Sandweiler

Post Code: L-5230 **Country:** Luxembourg **ID Number:** 0499

Name of Notified Body for noise emission assessment: Nederlands Keurings Instituut voor Pleziervaartuigen

Street: Nipkowweg 9 **Town:** Joure

Post Code: 8500 AB **Country:** The Netherlands **ID Number:** 0613

Module used for exhaust emission assessment: B+C ☐ B+D ☒ B+E ☐ B+F ☐ G ☐ H ☐
or engine type-approved according to: ☐ **stage II of Directive 97/68/EC** ☐ **Directive 88/77/EC**

Module used for noise emission assessment: Aa ☒ G ☐ H ☐

Other Community Directives applied: 89/336/EEC

DESCRIPTION OF ENGINE(s) AND ESSENTIAL REQUIERMENTS

Engine Type:
☐ Outboard
☒ z or sterndrive with integral exhaust

Fuel Type:
☒ Diesel
☐ Petrol

Combusion cycle:
☐ 2 stroke
☒ 4 stroke

Essential requirements	Standards Used	Other normative document used	See technical file
Annex I.B – Exhaust Emissions			
engine identification (I.B.1)			☐
exhaust emission requirements	EN ISO 8178-1:1996		☒
durability			☐
owner's manual			☐
Annex I.C – Noise Emissions			
Noise emission levels (I.C.1)	EN ISO 14509		☒
owner's manual (I.C.2)			☐

ENGINE(S) COVERED BY THIS DECLARATION

Engine model(s) or engine family name(s):	EC Type certificate number (exhaust)
	SNCH*94/25*2003/44*
RCD-4LHAX1	0015*00
4LHA-HTZP	
RCD-6LY2X1	0008*00
4LHA-DTZP	
4LHA-STZP	
RCD-6LPADX1	0012*00
6LPA-DTZP	
RCD-6LPASX1	0007*00
6LPA-STZP	

I declare on behalf of the engine manufacturer that the engine(s) mentioned above complie(s) with all applicable essential requirements in the way specified and is in conformity with the type for which above mentioned EC type examination certificate(s) has been issued.

Name: G. J. Mantel
(identification of the person empowered to sign on behalf of the engine manufacturer or his authorised representative)

Signature and title:
(or an equivalent marking)

Date: (yr/month/day) 2005 / 10 / 20

Yanmar Marine International B.V.

P.O. Box 30112, 1303AC Almere, The Netherlands
Brugplein 11, 1332 BS Almere-De Vaart, The Netherlands
Phone: +31 36-5493200
Fax: +31 36-5493209

Yanmar Co., Ltd

Head Office

1-32, Chayamachi, Kita-Ku, Osaka 530-8311,Japan

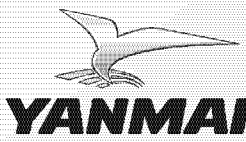
Yanmar Marine USA Corporation

101 International Parkway, Adairsville, GA 30103, USA
Phone: +1 770-877-9894
Fax: +1 770-877-7565

Yanmar Asia (Singapore) Corporation Pte Ltd.

4 Tuas Lane. Singapore 638613
Phone: +65 6861-3855
Fax: +65 6862-5195

Service Network: www.yanmarmarine.com



YANMAR CO.,LTD.

0A6LP-G00100
Rev.200610-000