WIRING DIAGRAM

3JH4E B-Type Instrument Panel

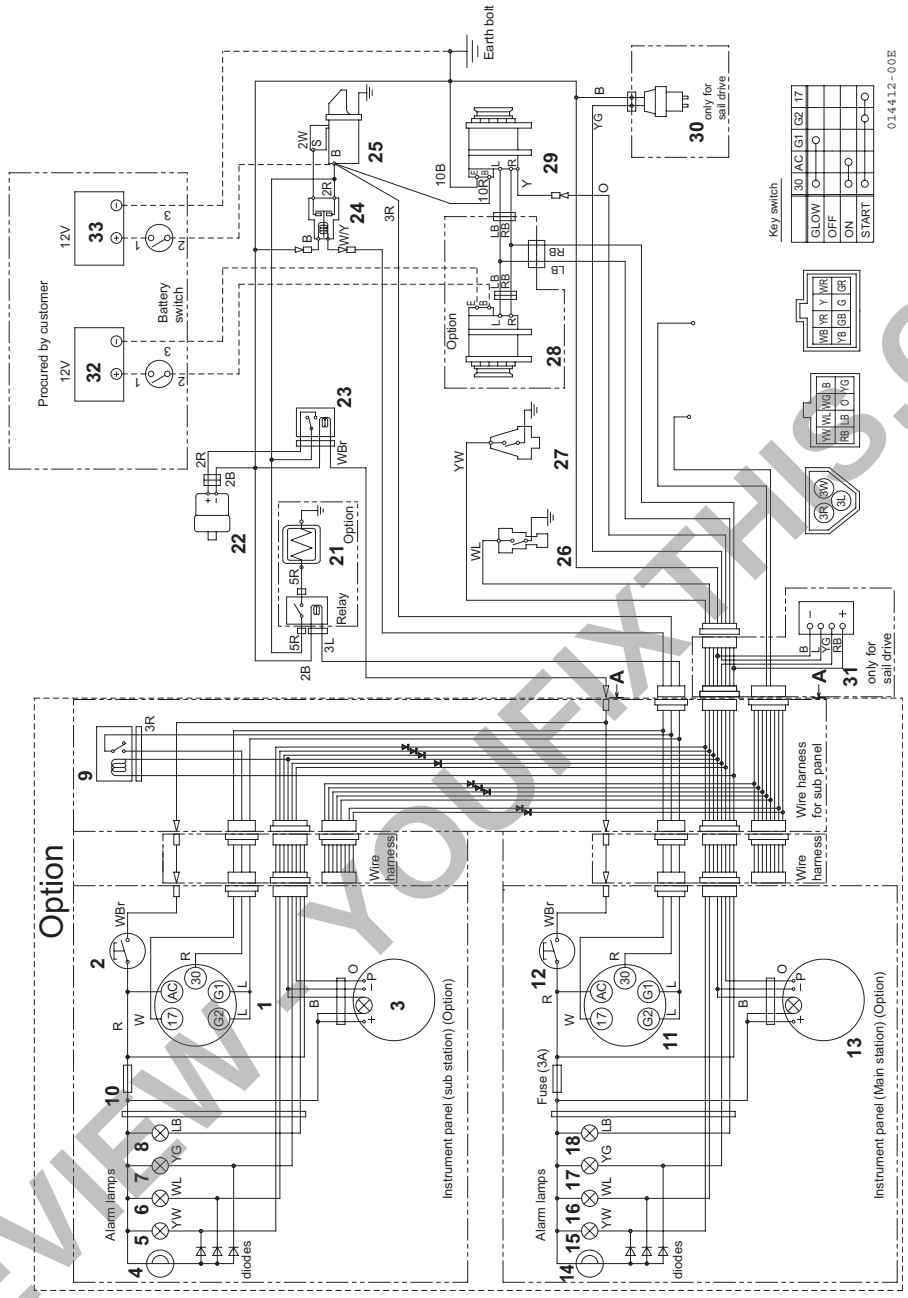


Figure 12-2

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3JH4E and 4JH4AE Engines Shown

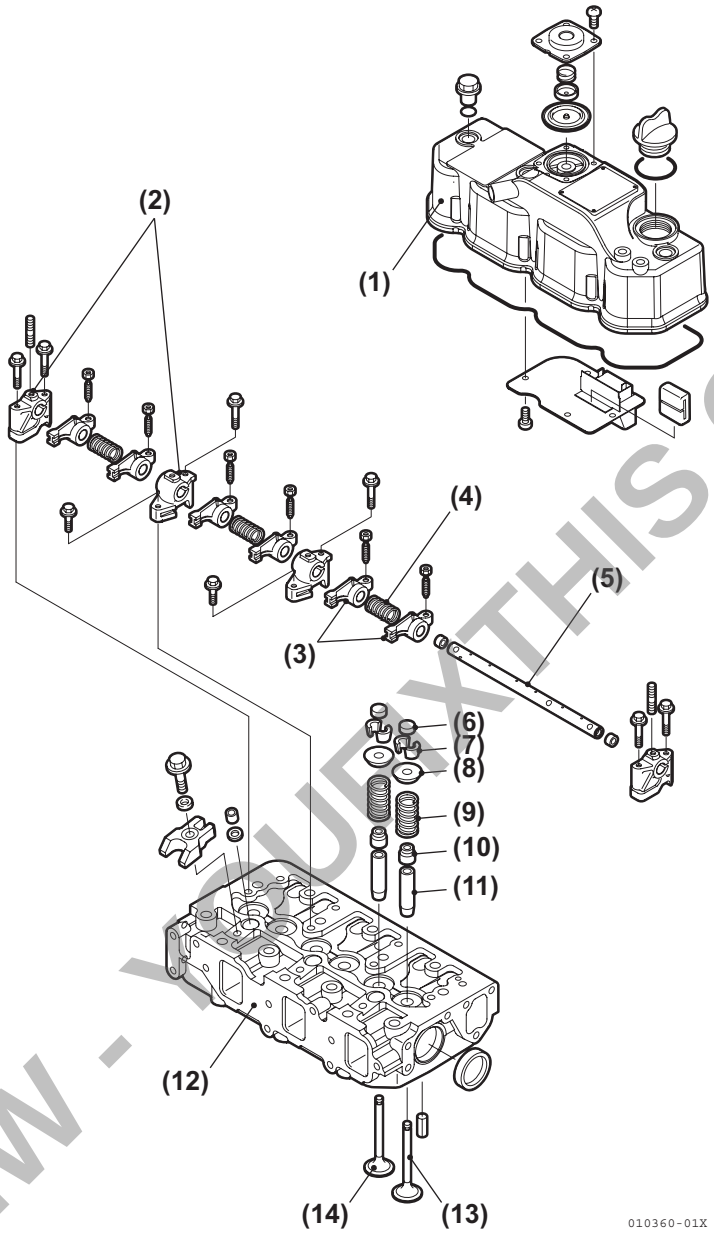


Figure 5-61

1 – Rocker Arm Cover
2 – Rocker Arm Support
3 – Rocker Arm
4 – Rocker Arm Spring(2Valve)
5 – Rocker Arm Shaft
6 – Valve Cap(2Valve)
7 – Cotter
8 – Spring Retainer
9 – Valve Spring
10 – Stem Seal
11 – Valve Guide
12 – Cylinder Head
13 – Intake Valve
14 – Exhaust Valve

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TIGHTENING TORQUES FOR STANDARD BOLTS AND NUTS

Use the correct amount of torque when tightening fasteners. Applying excessive torque may damage the fastener or component and not enough torque may cause a leak or component failure.

Hexagon Bolts and Nuts

N·m (kgf-m)

Name	Bolt dia. x pitch (mm)	Tightening torque	Remarks
Hexagon bolt with a "7" head and hexagon nut. ("7" mark means JIS strength classification "7T".)	M6 x 1	9.8-11.8 (1.0-1.2)	Apply 80% torque when tightening to aluminum alloy. Apply 60% torque to 4T bolts and locknuts. (4T bolt has no mark on the head.)
	M8 x 1.25	22.5-28.5 (2.3-2.9)	
	M10 x 1.5	44-54 (4.5-5.5)	
	M12 x 1.75	78.2-98.2 (8.0-10.0)	
PT plug (Taper plug)	1/8	9.8 (1.0)	
	1/4	19.6 (2.0)	
	3/8	29.4 (3.0)	
	1/2	58.8 (6.0)	
Line joint bolt	M8	12.7-16.7 (1.3-1.7)	
	M10	19.5-25.5 (2.0-2.6)	
	M12	24.4-34.4 (2.5-3.5)	
	M14	39.1-49.1 (4.0-5.0)	
	M16	48.9-58.9 (5.0-6.0)	

Hose Clamps

Note: Reuse and retightening is prohibited for all hose clamps. Always install new hose clamps.

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PERIODIC MAINTENANCE PROCEDURES

After Initial 50 Hours of Operation

Perform the following maintenance after the initial 50 hours of operation.

- **Draining Water and Sediment from the Fuel Tank**
  See Cleaning Fuel Injection Nozzle Cavities on page 6-15
- **Changing the Engine Oil and Replace the Engine Oil Filter**
  See Change Engine Oil, Replace Engine Oil Filter Element and Clean Engine Oil Cooler on page 8-9
- **Adjusting / Replacing the Alternator V-belt**
  See Replace V-Belt on page 11-9
- **Adjusting Intake / Exhaust Valve Clearance**
  See Inspection of Intake / Exhaust Valves and Valve Guides on page 5-55
- **Checking Remote Control Cable Operation**
  See Check and Adjust the Remote Control Operation on page 5-114
- **Adjusting Propeller Shaft Alignment (If Equipped with Marine Gear)**
  See Principal Engine Specifications on page 3-45

Every 50 Hours of Operation

After you complete the initial 50 hour maintenance procedures, perform the following procedures every 50 hours or monthly thereafter, whichever comes first.

- **Draining the Fuel Filter / Water Separator**
  See Fuel / Water Separator Replacement on page 6-38
- **Checking Battery Electrolyte Level (Serviceable Batteries Only)**
  See Tests and Adjustments on page 5-28

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ENGINE PIPING DIAGRAMS

3JH4E Models

3JH4E (KM35P, KM35A)

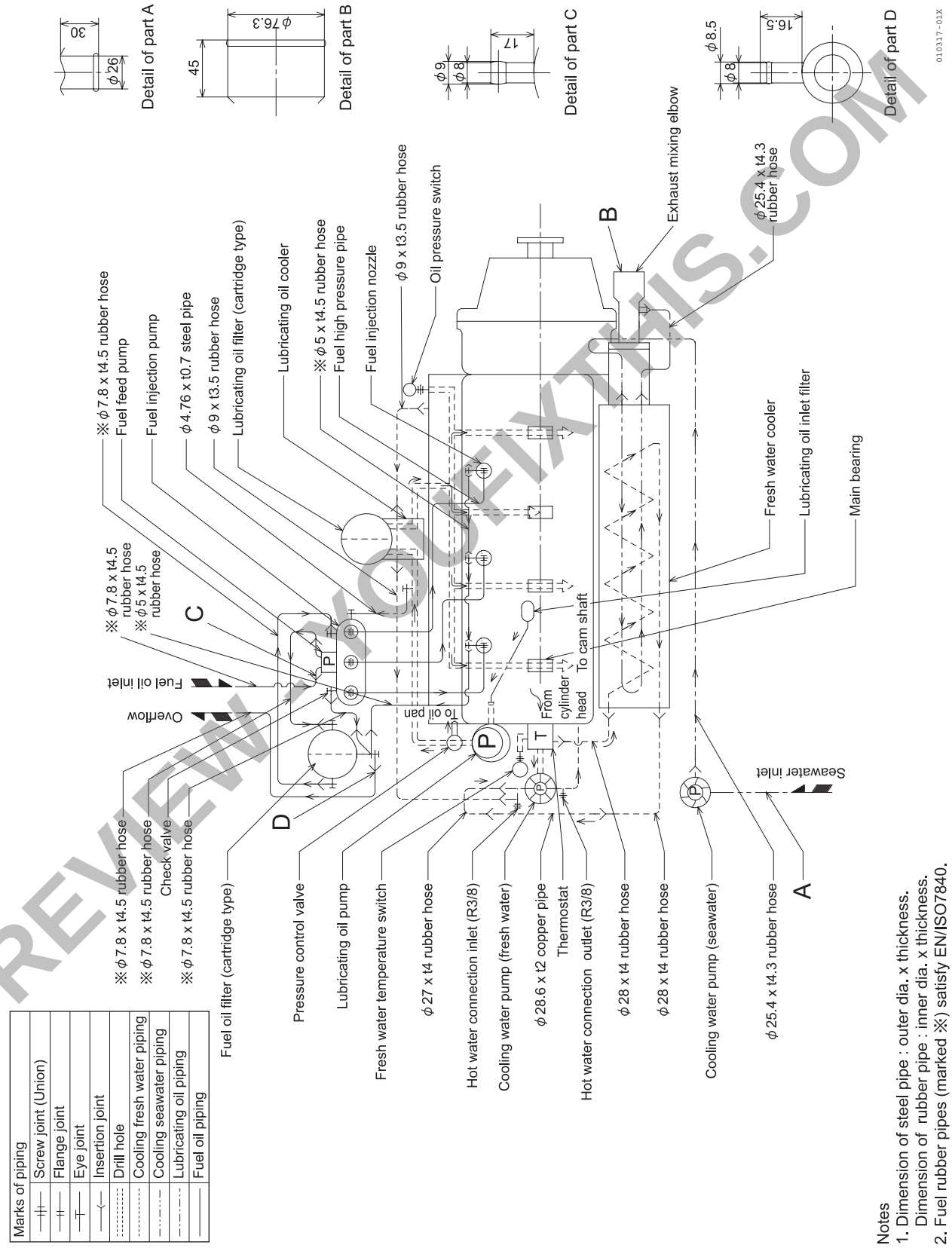


Figure 3-22

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TROUBLESHOOTING CHART

Starting Trouble

Problem / Symptom	Cause	Action	Reference
Engine Will Not Crank	Discharged battery	Charge / replace battery	See OEM Information
	Blown fuse	Replace fuse	*See Wiring Diagram on page 12-6*
	Defective starter motor	Replace starter motor	*See Starter Motor Service on page 10-6*
	Loose wiring connections	Tighten connections	*See Wiring Diagram on page 12-6*
	Faulty connection in starting switch	Repair using sandpaper or replace	*See Instrument Panel on page 12-18*
	Rough cap movement	Repair using sandpaper and then grease	*See Starter Motor Service on page 10-6*
	Edges of gear teeth misshapen	Adjust	*See Starter Motor Service on page 10-6*
	Piston ring sticks	Disassemble and repair or replace	*See Tests and Adjustments on page 5-28*
Engine Cranks but Will Not Start	No fuel to engine	Check fuel level in tank	See OEM Information
		Ensure all valves are on	See OEM Information
		Check fuel supply pump	*See MP Fuel Injection Pump System on page 6-41*
	No fuel to cylinders	Clean or replace clogged pre-filter (if equipped)	*See Fuel Line Replacement Filter on page 6-36*
		Clean or replace fuel filter / water separator	*See Fuel / Water Separator Replacement on page 6-38*
		Replace clogged fine filter	*See Fuel Line Replacement Filter on page 6-36*
		Bleed fuel system	*See Bleeding the Fuel System on page 6-40*
		Check fuel injection pump and replace if necessary	*See MP Fuel Injection Pump System on page 6-41*
		Check fuel injection nozzle and replace if necessary	*See Fuel Injectors on page 6-63*
		Check fuel injection pipes and replace if necessary	*See Fuel System Components on page 6-48*
	Water in fuel tank	Drain water from fuel tank	See OEM Information
	Leakage pressurized air	Check cylinder gasket and bolt or suction/exhaust valves and piston ring. Replace if necessary	*See Test Compression on page 5-28*
	Governor handle is in STOP position	Move governor handle to acceleration position	*See Governor on page 6-27*
	Low ambient temperature	Install optional glow plug control	NA
		Install block heater	NA
	Oil viscosity too high	Replace with correct viscosity oil for operating conditions	*See Engine Oil Specifications on page 3-43*

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PRINCIPAL ENGINE SPECIFICATIONS

3JH4E Engine Specifications

Specification		3JH4E			
Marine Gear Model		**KM35P**	**KM35A**	**SD40 / SD50**	**Bobtail**
Use		Pleasure use			
Type		Vertical water cooled 4-cycle diesel engine			
Combustion system		Direct injection			
Aspiration		Natural aspiration			
Number of cylinders		In-line 3			
Bore x stroke		88 mm x 90 mm (3.46in. x 3.54in.)			
Displacement		1.642 L (100.20 cu in.)			
Continuous power	Output at crankshaft / Engine speed	26.7 kW (36.3 hp metric)/2907 minimum^{-1}			
Maximum Rated Output Power	Output at crankshaft / Engine speed	29.4 kW (40.0 hp metric) / 3000 minimum^{-1} * 28.7 kW (39.0 hp metric) / 3000 minimum^{-1} **			
	Output at propeller / Engine speed	28.0 kW (38.1 hp metric) / 3000 minimum^{-1} * 27.4 kW (37.3 hp metric) / 3000 minimum^{-1} **		-	-
Installation		Flexible mounting			
Fuel injection timing		FID 12 ± 1 deg b.T.D.C (FIC 13 ± 1 deg b.T.D.C)			
Fuel injection opening pressure		21.6 ± 0.5 MPa			
Main power take off		At flywheel end			
Direction of Rotation	Crankshaft	Counterclockwise viewed from stern			
	Propeller shaft (Ahead)	Clockwise viewed from stern		-	-
Cooling system		Freshwater cooling with heat exchanger			

Note: Density of fuel: 0.842g/cm^3 at 15°C
1 hp metric=0.7355 kW

* Rating Condition: Temperature of fuel; 25°C at FO pump inlet; ISO 3046-1

** Rating Condition: Temperature of fuel; 40°C at FO pump inlet; ISO 8665

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PERIODIC MAINTENANCE SCHEDULE

Daily and periodic maintenance is important to keep the engine in good operating condition. The following is a summary of maintenance items by periodic maintenance intervals. Periodic maintenance intervals vary depending on engine application, loads, diesel fuel and engine oil used and are hard to establish definitively. The following should be treated only as a general guideline.

○: Check ◇: Replace ●: Contact your authorized Yanmar Marine dealer or distributor

System	Item		Periodic Maintenance Interval			
			Every 50 hours or monthly whichever comes first	Every 250 hours or one year whichever comes first	Every 500 hours or 2 years whichever comes first	Every 1000 hours or 4 years whichever comes first
Whole	Visual inspection of engine exterior					
Fuel System	Check the fuel level and refill if necessary					
	Drain water and sediment from fuel tank		○ Initial 50	○		
	Drain the fuel / water separator		○			
	Replace the fuel filter element			◇		
	Check the fuel injection timing					●
	Check the fuel injector spray pattern*					●*
Lubricating System	Check the lubricating oil level	Engine				
		Marine Gear				
	Replace the lubricating oil	Engine	◇ Initial 50	◇		
		Marine Gear	◇ Initial 50	◇		
	Replace the oil filter element	Engine	◇ Initial 50	◇		
		Marine Gear (if equipped)	◇ Initial 50	◇		
Cooling System	Seawater outlet					
	Check coolant level					
	Check or replace the seawater pump impeller			○		◇
	Replace coolant		Every year When long life coolant is used, replace every two years. *See Engine Coolant Specifications on page 3-44.*			
	Clean and check the seawater passages					●

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Section 2

SAFETY

SAFETY STATEMENTS

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



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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

Indicates a situation which can cause damage to the engine, personal property and / or the environment or cause the equipment to operate improperly.

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4JH4-HTE (KMH4A, ZF25A)

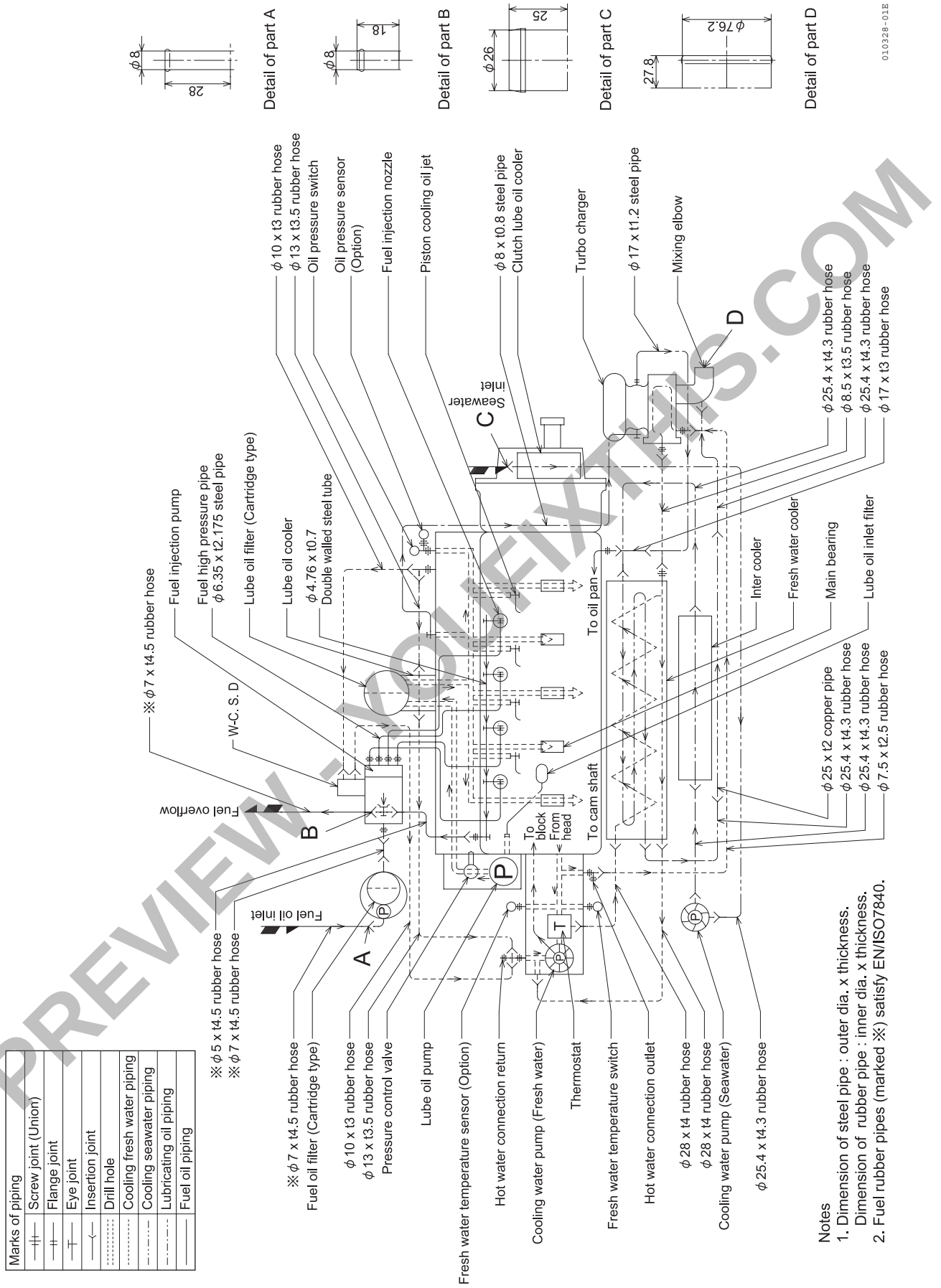
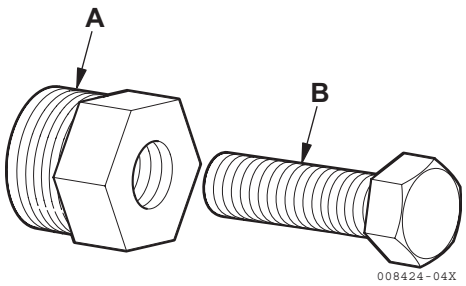
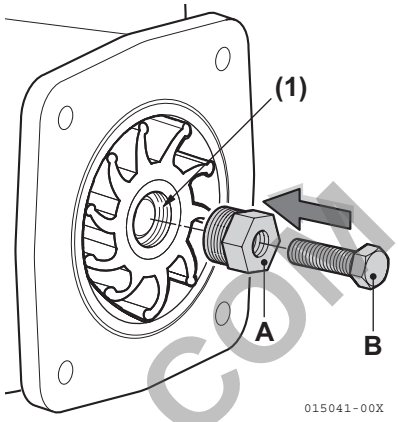


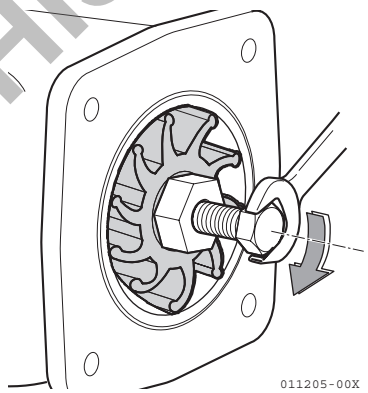
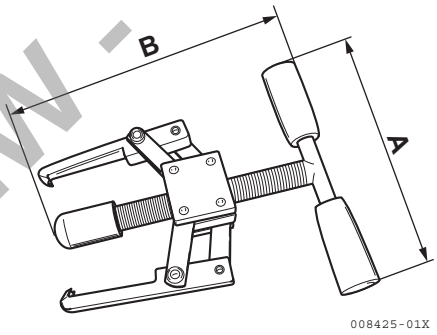
Figure 3-33

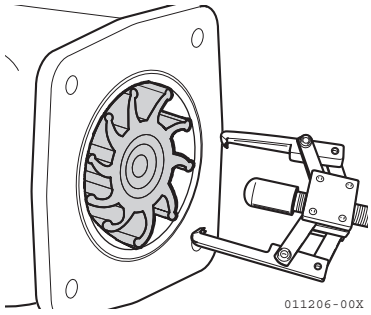
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<table>
<tr><th>No.</th><th>Tool Name
Applicable Model</th><th>Applicable Model and Tool Size</th><th>Illustration</th></tr>
<tr><td>6</td><td>Puller A (standard) for seawater pump impeller</td><td>Puller A: 129671-92110 (standard)


<table>
<tr><th>A</th><th>B</th></tr>
<tr><td>M18 x 1.5</td><td>M10-length 40 mm</td></tr>
</table></td><td>

1 – M18 x 1.5 threaded

</td></tr>
<tr><td>7</td><td>Puller B (option) for seawater pump impeller</td><td>Puller B: 129671-92100 (option)


mm
<table>
<tr><th>A</th><th>B</th></tr>
<tr><td>Around 110</td><td>Around 140</td></tr>
</table></td><td>
</td></tr>
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Piston Pin

A floating type piston pin is used in this engine. The piston pin can be pressed into the piston pin hole at room temperature (Coat with oil to make it slide easily).

Measure the outer diameter and replace the pin if it is excessively worn.

		Standard	Limit
Piston Pin Hole Inside Dia.	3JH4E / 4JH4AE	26.000 ~ 26.009 mm (1.0236 ~1.0240 in.)	26.020 mm (1.0244 in.)
	4JH4-TE / 4JH4-HTE	28.000 ~ 28.009 mm (1.1024 ~ 1.1028 in.)	28.020 mm (1.1032 in.)
Piston Pin Outside Dia.	3JH4E / 4JH4AE	25.995 ~ 26.000 mm (1.0234 ~ 1.0236 in.)	25.965 mm (1.0222 in.)
	4JH4-TE / 4JH4-HTE	27.995 ~ 28.000 mm (1.1022 ~ 1.1024 in.)	27.965 mm (1.1010 in.)
Clearance	JH4 SIRES	0 ~ 0.014 (0 ~ 0.0006 in.)	0.074 mm (0.0029 in.)

Measure the piston pin hole diameter at the positions a and b in directions A and B **(Figure 5-87)**.

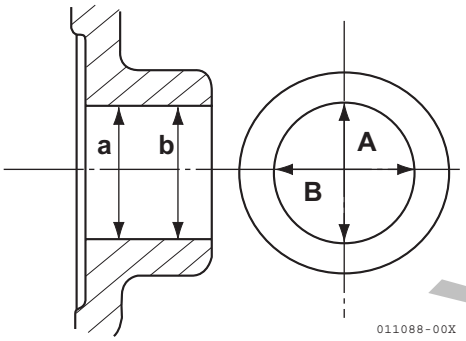


Figure 5-87

Measure the piston pin outside diameter at the positions a and b in directions A and B **(Figure 5-88)**.

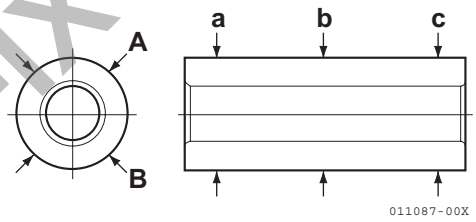


Figure 5-88

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72. Connect the electric wiring to the proper terminals, observing the color coding to make sure the connections are correct. Clamp the wire harness by fastening the clamp to upside, to avoid the interference to the mounting foot **(Figure 5-201)**.

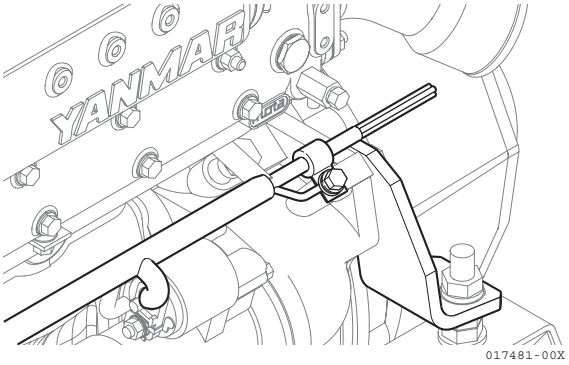


Figure 5-201

73. Connect the electric wires to the terminals before attaching the alternator to the gear case **(Figure 5-202)**.

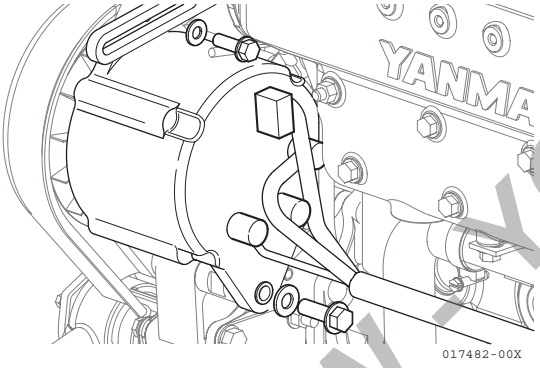


Figure 5-202

74. Installation in a boat and completion of the piping and wiring:
    - Mount the engine on the engine bed in the engine room of a boat after all engine assembly has been completed.
    - Connect the coolant pipes, fuel pipes, other pipes on the boat and the exhaust hoses.
    - Connect the battery, instrument panel, remote control cable and other wiring.

75. Fill the engine with lubricating oil from the supply port on top of the gear case or the rocker arm cover and fill the marine gearbox from the supply port on top of the reduction gear case. **(Figure 5-203)** and **(Figure 5-204)**.

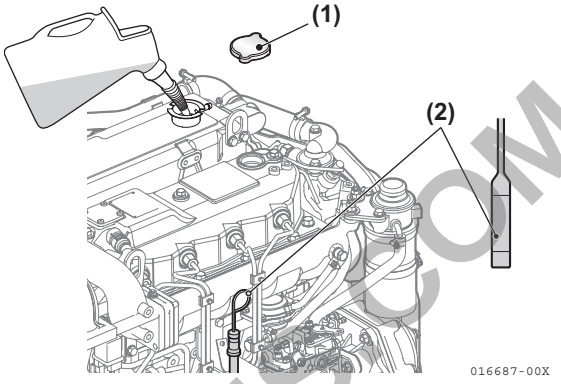


Figure 5-203

1 – Supply Port
2 – Dipstick

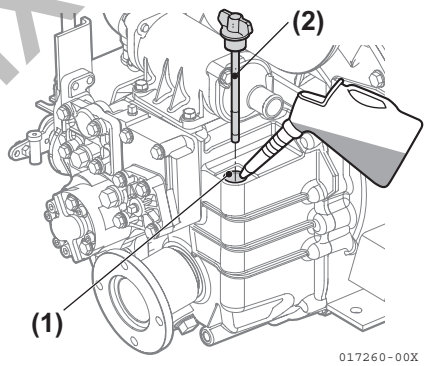


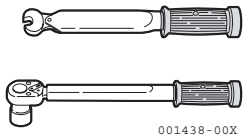
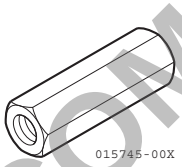
Figure 5-204

1 – Supply Port
2 – Dipstick

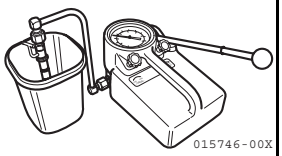
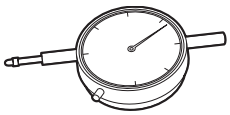
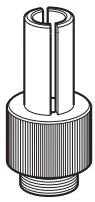
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SPECIAL SERVICE TOOLS

No.	Tool Name		Application	Illustration
1	Torque Wrench	Locally Available	For tightening nuts and bolts to the specified torque	 001438-00X
2	Fuel Injector Removal Tool	Yanmar Part No. 129470-92305	Used in conjunction with a slide hammer to remove the fuel injectors (2-valve cylinder heads)	 015745-00X

MEASURING INSTRUMENTS

No.	Instrument Name		Application	Illustration
1	Fuel Injector Tester	Locally Available	For observing injection spray pattern of fuel injection nozzle and measuring injection pressure	 015746-00X
2	Dial Indicator*	Mituotoyo 2050SB - Locally Available	Check and adjust fuel injection timing	 001429-00X
	Extension Rod*	Mituotoyo 303613 - Locally Available		
3	Fuel Injection Pump Plunger Adapter*	(M14) TNV82-88 - Yanmar Part No. 158090-51831	Mount dial indicator to fuel injection pump	 015747-00X
		(M16) TNV94-106 - Yanmar Part No. 158090-51841		
4	Plunger Adapter Clamp	Yanmar Part No. 23000-013000	Clamps stem of dial indicator in plunger adapter.	 015748-00X

* *These special service tools may also be available as an "MP Fuel Injection Pump Special Tool Set", under a different part number, in territories serviced by Yanmar America and Yanmar Europe. Contact your authorized Yanmar dealer or distributor for details.*

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Assembly

When bilge is being used, assemble in accordance with the following.

1. Assembling the bilge pump:
   - Select a dry place above the bilge water level.
   - Select the location for the bilge pump taking into consideration the length of the switch cable (approximately 3 m [9.8 ft]) and its attachment point, and the position of the battery.
   - Position at a 45° angle **(Figure 7-42)** with the nozzle facing up, and 50-70 cm (19.7-27.6 in.) from the bottom of the boat.

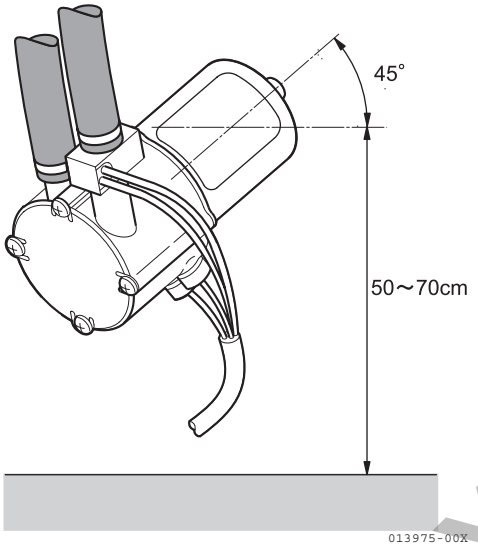


Figure 7-42

2. Assembling the switch:

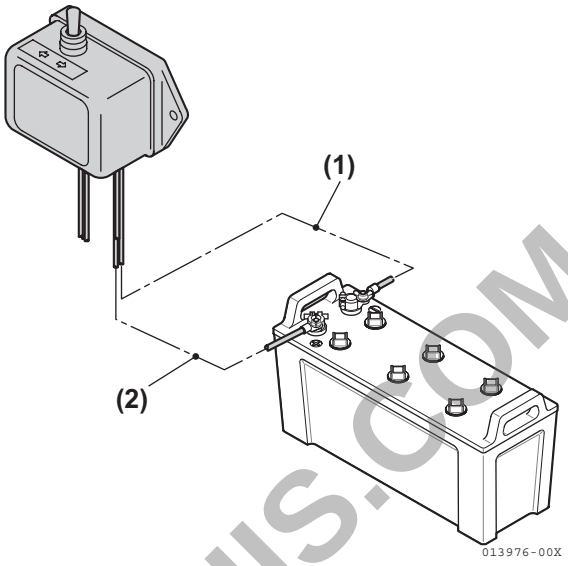


Figure 7-43

1 – Red wire (+)
2 – White wire (-)

- Attach in a place to ensure easy operation away from rainwater.
- Connect the terminal to the battery. When the cord will not reach the battery, an extension of no greater than 3 m(9.8 ft) length suitable for AV3mm^2 can be attached.
- Position the strainer. Attach at the place where the greatest amount of water is collected when the boat is stopped.

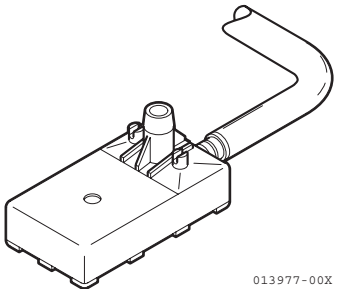


Figure 7-44

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