HINSHI–H8013-R1

T-NE

YANMAR

SERVICE MANUAL

INDUSTRIAL DIESEL ENGINE

MODEL **4TNE94·98·106(T)**

(Direct Injection System)



YANMAR DIESEL ENGINE CO.,LTD.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

CONTENTS

1. GENERAL ..... 1-1~1-13
2. TROUBLESHOOTING ..... 2-1~2-6
3. INSPECTION AND ADJUSTMENT ..... 3-1~3-15
4. ENGINE BODY ..... 4-1~4-30
5. LUBRICATION SYSTEM ..... 5-1~5-2
6. COOLING SYSTEM ..... 6-1~6-2
7. FUEL INJECTION SYSTEM/GOVERNOR ..... 7-1~7-9
8. TURBOCHARGER (FOR 4TNE106T) ..... 8-1~8-18
9. STARTING MOTOR ..... 9-1~9-29
9.1 For 4TNE94/98 ..... 9-1~9-17
9.2 For 4TNE106(T) ..... 9-18~9-29
10. ALTERNATOR ..... 10-1~10-21
10.1 For 4TNE94/98 ..... 10-1~10-13
10.2 For 4TNE106(T) ..... 10-14~10-21
11. SPECIAL SERVICE TOOLS ..... 11-1~11-5
12. SERVICE STANDARDS ..... 12-1~12-7

PREVIEW - YOUFIXTHIS.COM

Printed in Japan
HINSHI-H8013-R1

Download full manual at youfixthis.com

Precautions for Safe Servicing

(A) Service Shop (Place)

⚠ WARNING



- **Place allowing sufficient ventilation**
  Jobs such as engine running, part welding and polishing the paint with sandpaper should be done in a well-ventilated place.
  [Otherwise]
  Very dangerous for human body due to the possibility of poisonous gas or dust inhalation.

⚠ CAUTION

- **Sufficiently wide and flat place**
  The floor space of the service shop for inspection and maintenance shall be sufficiently wide and flat without any hole.
  [Otherwise]
  An accident such as a violent fall may be caused.

⚠ CAUTION

- **Clean, orderly arranged place**
  No dust, mud, oil or parts shall left uncleaned on the floor surface.
  [Otherwise]
  An unexpected accident may be caused.

⚠ CAUTION



- **Bright, safely illuminated place**
  The working place should be illuminated sufficiently and safely. For a job in a dark position involving difficulty in observation, use a portable safety lamp. The bulb shall be covered with a wire cage.
  [Otherwise]
  The bulb may be broken accidentally to cause ignition of leaking oil.

⚠ CAUTION



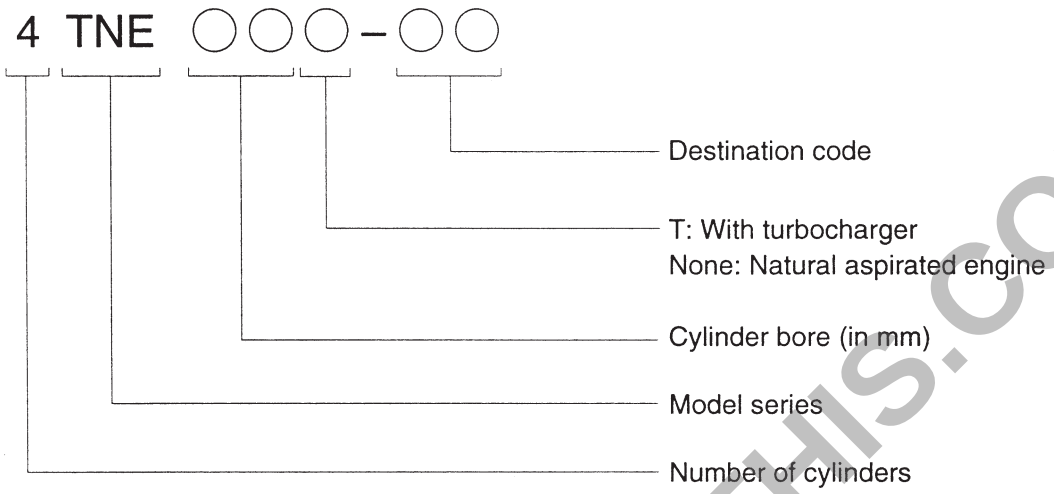
- **Place equipped with a fire extinguisher**
  Keep a fast aid kit and fire extinguisher close at hand in preparation for an emergency of fire starting.

PREVIEW - YOUFIXTHIS.COM

Printed in Japan
HINSHI-H8013-R1

Download full manual at youfixthis.com

1.1 Engine Nomenclature



• Engine application class

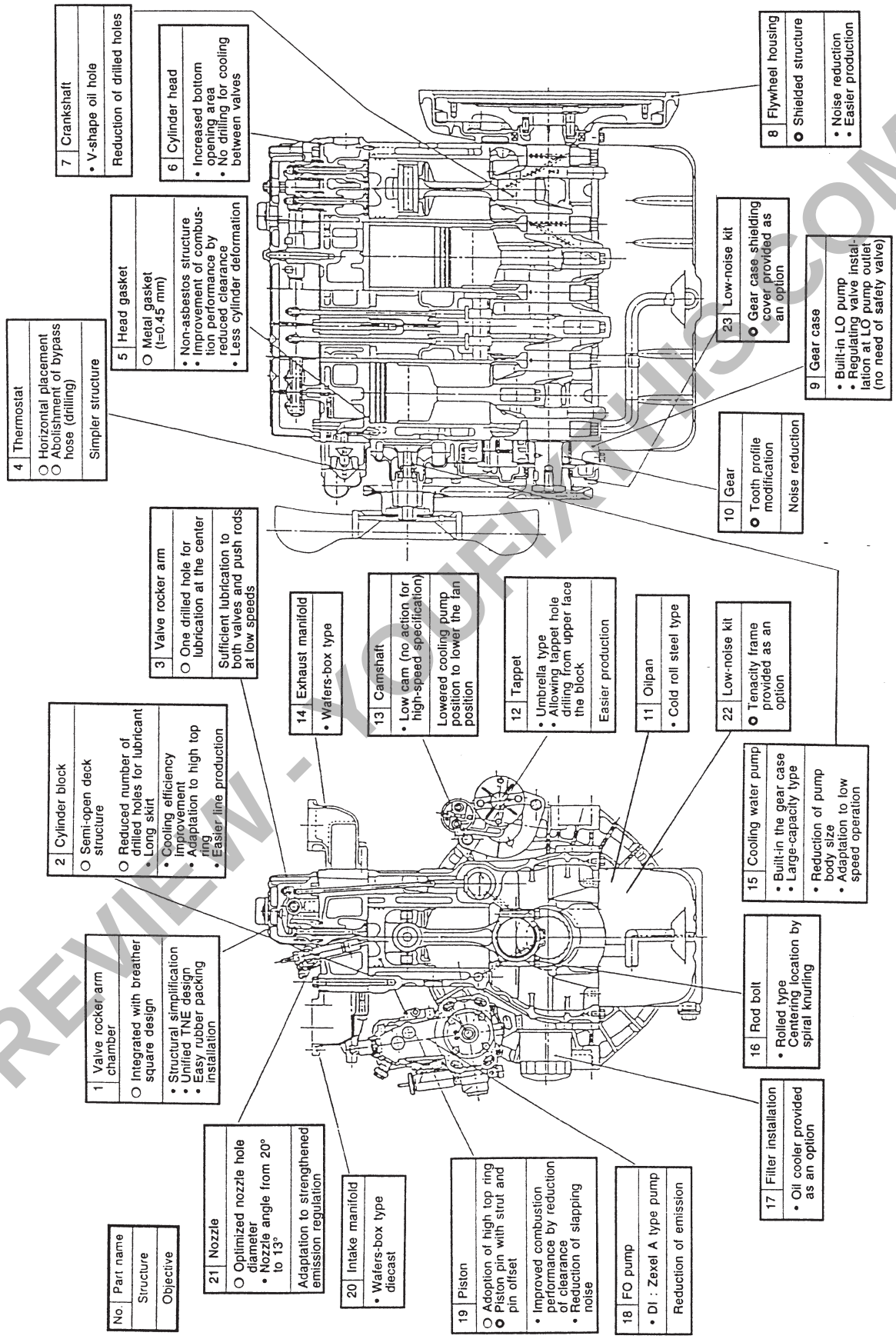
	Application	Revolving speed	Number of revolutions (rpm)
CL	Generator driving	Constant speed	1500/1800
VM	General purpose	Variable speed	2000~2500

※The engine application class (CL or VM) is described in the specifications table.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

1.5 Structural Description



PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

	Trouble symptom / Cause	Starting failure: Engine does not start.	Starting failure: Engine starts but stops soon. Exhaust smoke: None	Starting failure: Engine starts but stops soon. Exhaust smoke: Little	Starting failure: Engine starts but stops soon. Exhaust smoke: Much	Insufficient engine output: Exhaust color: Ordinary	Insufficient engine output: Exhaust color: White	Insufficient engine output: Exhaust color: Black	Poor exhaust color: During work: White	Poor exhaust color: During work: Black	High knocking sound during combustion	Abnormal engine sound	Uneven combustion sound	Hunting: During idling	Hunting: During work	Large engine vibration	Difficulty in returning to low speed	Excessive fuel consumption	Lubricating oil: Excessive consumption	Lubricating oil: Dilution by fuel oil	Lubricating oil: Mixture with water	Lubricating oil: Low L.O. pressure	Much blow-by gas	Cooling water: Overheat	Cooling water: Low water temperature	Air intake: Pressure drop	Air intake: Pressure rise	Exhaust temperature rise		Corrective action
Air/Exhaust Gas System	Clogged air filter				○			○		○			○													○				Clean.
	Engine used at high temperatures or at high altitude							○		○								○						○		○				Study output drop and load matching.
	Clogged exhaust pipe							○		○			○															○		Clean.
Electrical System	Starting motor defect	○																												Repair or replace. (See Chapter 9.)
	Alternator defect	○																												Repair or replace. (See Chapter 10.)
	Open-circuit in wiring	○																												Repair.
	Battery voltage drop	○																												Inspect and charge the battery. (See 3.10 in Chapter 3.)

WWW.SIHLXIE.COM - YOUR PREVIEW -

Download full manual at youfixthis.com

Printed in Japan
HINSHI-H8013-R1

3. INSPECTION AND ADJUSTMENT ..... 3-1~3-15

3.1 OIL INSPECTION 3-1

3.2 COOLING WATER INSPECTION 3-1

3.3 INSPECTING WATER LEAK FROM COOLING WATER SYSTEM AND RADIATOR 3-1

3.4 FAN BELT TENSION INSPECTION AND ADJUSTMENT 3-2

3.5 ADJUSTING THE VALVE CLEARANCE 3-3

3.6 INSPECTING THE FUEL INJECTION VALVE INJECTION PRESSURE AND SPRAY PATTERN 3-4

3.7 FUEL INJECTION TIMING INSPECTION AND ADJUSTMENT 3-8

3.8 ADJUSTING THE NO-LOAD MAXIMUM (OR MINIMUM) REVOLUTIONS 3-9

3.9 SENSOR INSPECTION 3-10

3.10 BATTERY INSPECTION 3-11

3.11 ADJUSTING OPERATION 3-13

3.12 LONG STORAGE 3-14

3.13 PERIODIC MAINTENANCE SCHEDULE 3-15

PREVIEW - YOUFIXTHIS.COM

Printed in Japan
HINSHI-H8013-R1

Download full manual at youfixthis.com

(2) 4TNE98

Engine name		Unit	4TNE98					
Engine specification class		–	CL		VM			
Type		–	Vertical, in-line, 4-cycle, water-cooled diesel engine					
Combustion chamber		–	Direct injection					
Number of cylinders		–	4					
Cylinder bore × stroke		mm × mm	98 × 110					
Displacement		ℓ	3.319					
Continuous rating	Revolving speed	rpm	1500	1800	–			
	Output	kW (hp)	30.9 (41.4)	36.8 (49.3)	–			
Rated output	Revolving speed	rpm	1500	1800	2000	2200	2400	2500
	Output	kW (hp)	34.6 (46.4)	41.2 (55.3)	41.9 (56.2)	45.6 (61.2)	49.3 (66.1)	51.1 (68.5)
Fuel injection timing (FID, bTDC)		deg	10~12					
Fuel injection pressure		MPa (kgf/cm²)	21.57~ 22.55 (220~230)					
Ignition order		–	1–3–4–2 (No. 1 cylinder on flywheel side)					
Power take off		–	Flywheel					
Direction of rotation		–	Counterclockwise (viewed from flywheel)					
Cooling system		–	Radiator					
Lubrication system		–	Forced lubrication with trochoid pump					
Starting system		–	Electric					
Applicable fuel		–	Diesel oil-ISO 8217 DMA, BS 2869 A1 or A2 (cetane No. 45 min.)					
Applicable lubricant		–	API grade class CD					
Battery capacity		V-AH	12–64 (5HR) or above					
Lubricant capacity (oil pan)	Total	ℓ	10.2					
	Effective	ℓ	4.5					
Cooling water capacity (engine only)		ℓ	4.2					
Engine dimensions	Overall length	mm	720					
	Overall width	mm	508					
	Overall height	mm	689					
Engine weight (dry)		kg	223					

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

3.11 Adjusting Operation

Perform adjusting operation as follows after the maintenance job:

(1) Supply the fuel oil, lubricating oil and cooling water.

Note: Check the levels of the lubricating oil and cooling water again after test running (for about 5 minutes) and add as required.

(2) Start the engine, and carry out idling at a low revolution (700 to 900 rpm) for a few minutes.

(3) Run in the engine for about five minutes at the rated revolution (no-load). Check any water, fuel or oil leak and existence of abnormal vibration or noise. Also check the oil pressure, cooling water temperature and exhaust gas color.

(4) Adjust the no-load minimum and maximum revolutions according to the specifications.

(5) Perform loaded operation as required.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

(3) Reassembly procedure:
Reverse order of the disassembly procedure.

(4) Servicing points

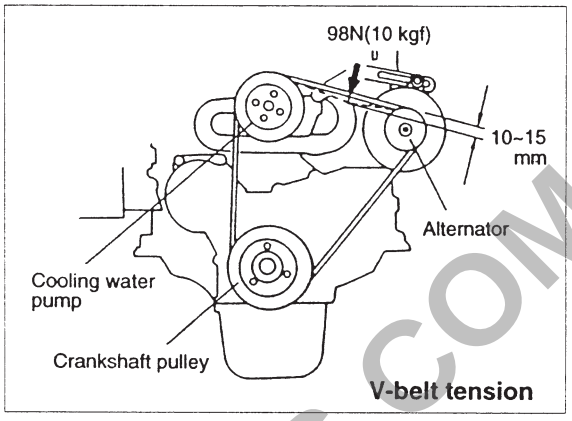
Point 1

Disassemble:

- Loosen the mounting bolt while supporting the alternator.

⚠ CAUTION

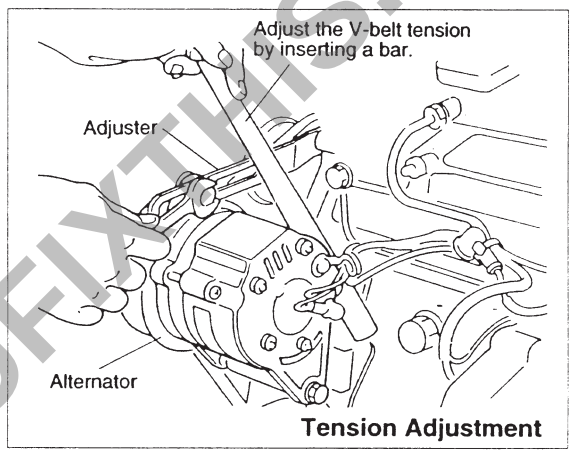
Do not tilt the alternator toward the cylinder block in a haste since it may damage the alternator or pinch a finger.



V-belt tension

Reassemble:

- The belt deflection shall be 10~15 mm (7 ~ 9 mm for a new belt).



Tension Adjustment

Reassemble:

- Replace the belt with a new one if cracked, worn or damaged.
- Carefully prevent the belt from being smeared with oil or grease.

Point 2

Reassemble:

- Check the thermostat function. (See 3.9 in Chapter 3 for the check procedure.)

Point 3

Reassemble:

- Replace the fuel filter element with a new one.

Disassemble:

- Cover the fuel pipe opening with tape to prevent intrusion of foreign matters.

Point 4

Reassemble:

- Replace the oil filter with a new one.
- After fully tightening the filter manually, retighten it with a filter wrench (see 11.1-6 in Chapter 11) by 3/4 turn.

Point 5

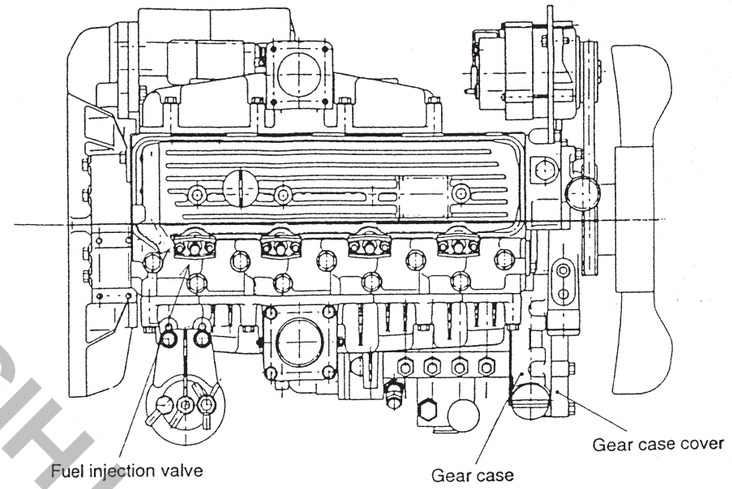
Disassemble:

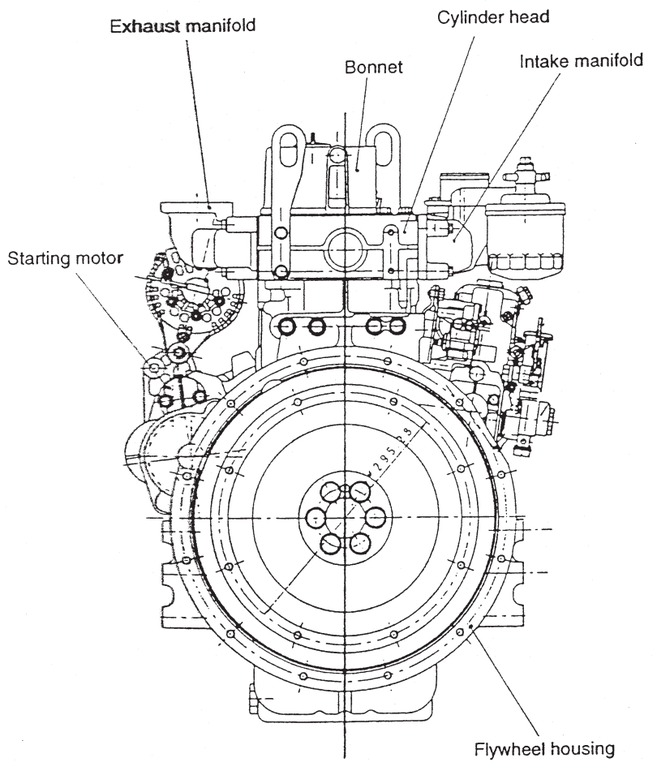
- Cover the fuel injection pipe and pump inlets and outlets with tape or the like to prevent intrusion of foreign matters.

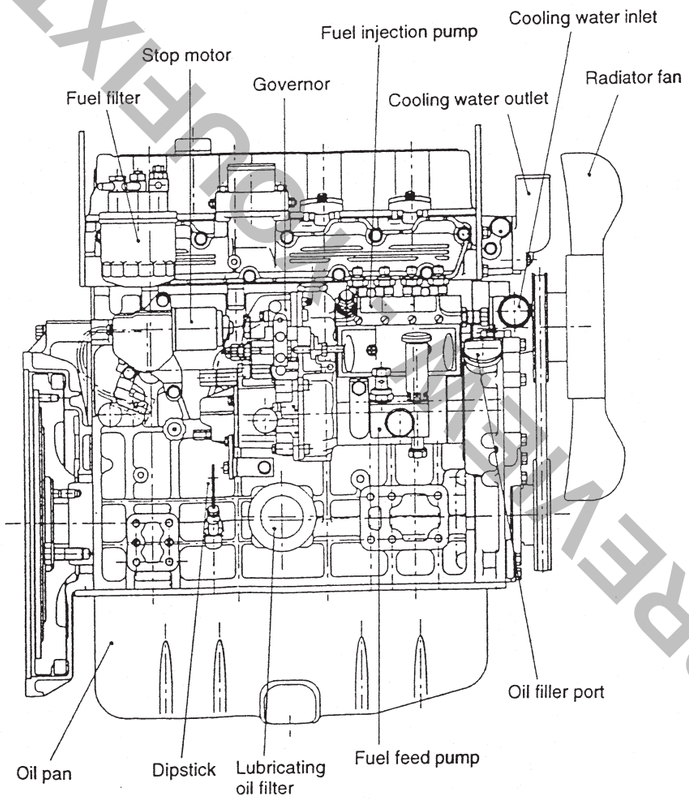
PREVIEW - YOUFIXTHIS.COM

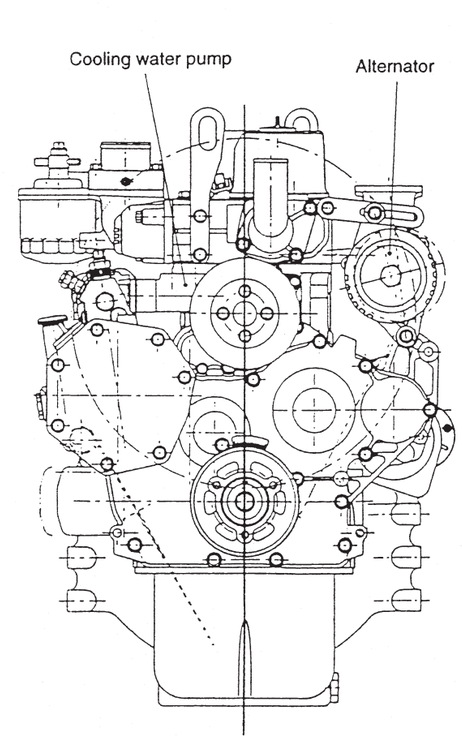
Download full manual at youfixthis.com

1.4 Engine External Views









PREVIEW ONLY
FIXTHIS.COM
Download full manual at youfixthis.com

Printed in Japan
HINSHI-H8013-R1

⚠ For Safe Servicing

- Most accidents are caused by negligence of basic safety rules and precautions. For accident prevention, it is important to avoid such causes before development to accidents.
  Please read this manual carefully before starting repair or maintenance to fully understand safety precautions and appropriate inspection and maintenance procedures.
  Attempting at a repair or maintenance job without sufficient knowledge may cause an unexpected accident.

- It is impossible to cover every possible danger in repair or maintenance in the manual. Sufficient consideration for safety is required in addition to the matters marked ⚠ CAUTION. Especially for safety precautions in a repair or maintenance job not described in this manual, receive instructions from a knowledgeable leader.

- Safety marks used in this manual and their meanings are as follows:

⚠ **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.

- Any matter marked **[NOTICE]** in this manual is especially important in servicing. If not observed, the product performance and quality may not be guaranteed.

PREVIEW - YOUFIXTHIS.COM

Printed in Japan
HINSHI-H8013-R1

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 12 of 180 pages

The full manual includes:

- All 180 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Yanmar 4TNE94, 4TNE98, 4TNE106, 4TNE106T, 4TNE94.98.106(T) Service Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual