



DIESEL ENGINE FOR MARINE USE

metemar
concessionaria motori marini

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WORKSHOP MANUAL

W06D-TI, W06D-TI-II

Hino Motors, Ltd.

FOREWORD

This workshop manual has been prepared to provide information covering repair procedures on Hino Marine Engine.

Applicable models: W06D-TI and W06D-TI-II engine

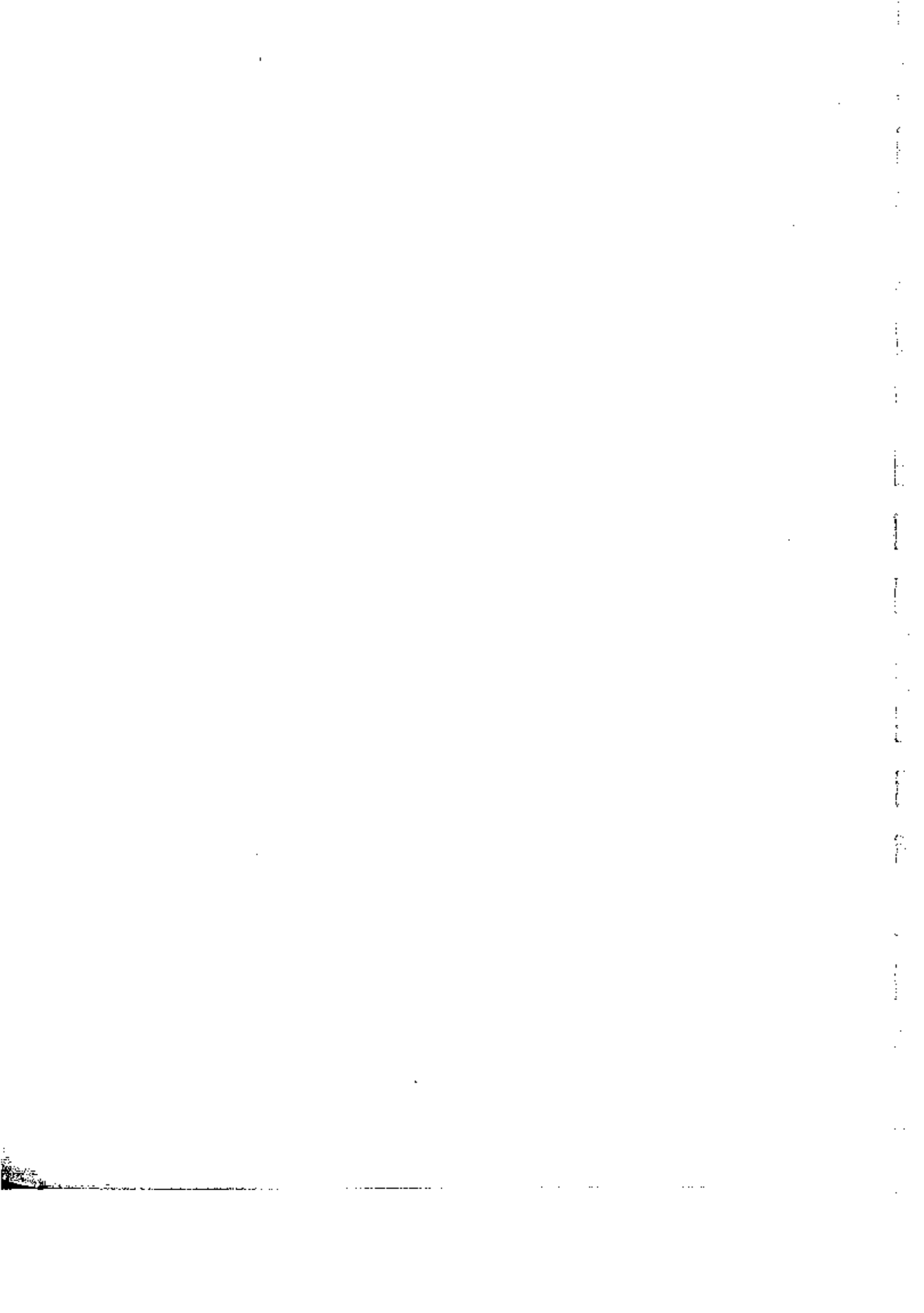
When making any repair on your vehicle, be careful not to be injured through improper procedures.

As for maintenance items, refer to the Operation Hand Book.

All information and specifications in this manual are based upon the latest product information available at the time of printing.

Hino Motors reserves the right to make changes at any time without prior notice.

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WORKSHOP MANUAL

INDEX: ENGINE GROUP

GENERAL
INTRODUCTION

ENGINE

ELECTRICAL
EQUIPMENT

TURBOCHARGER

INJECTION
PUMP

INJECTION PUMP
GOVERNOR

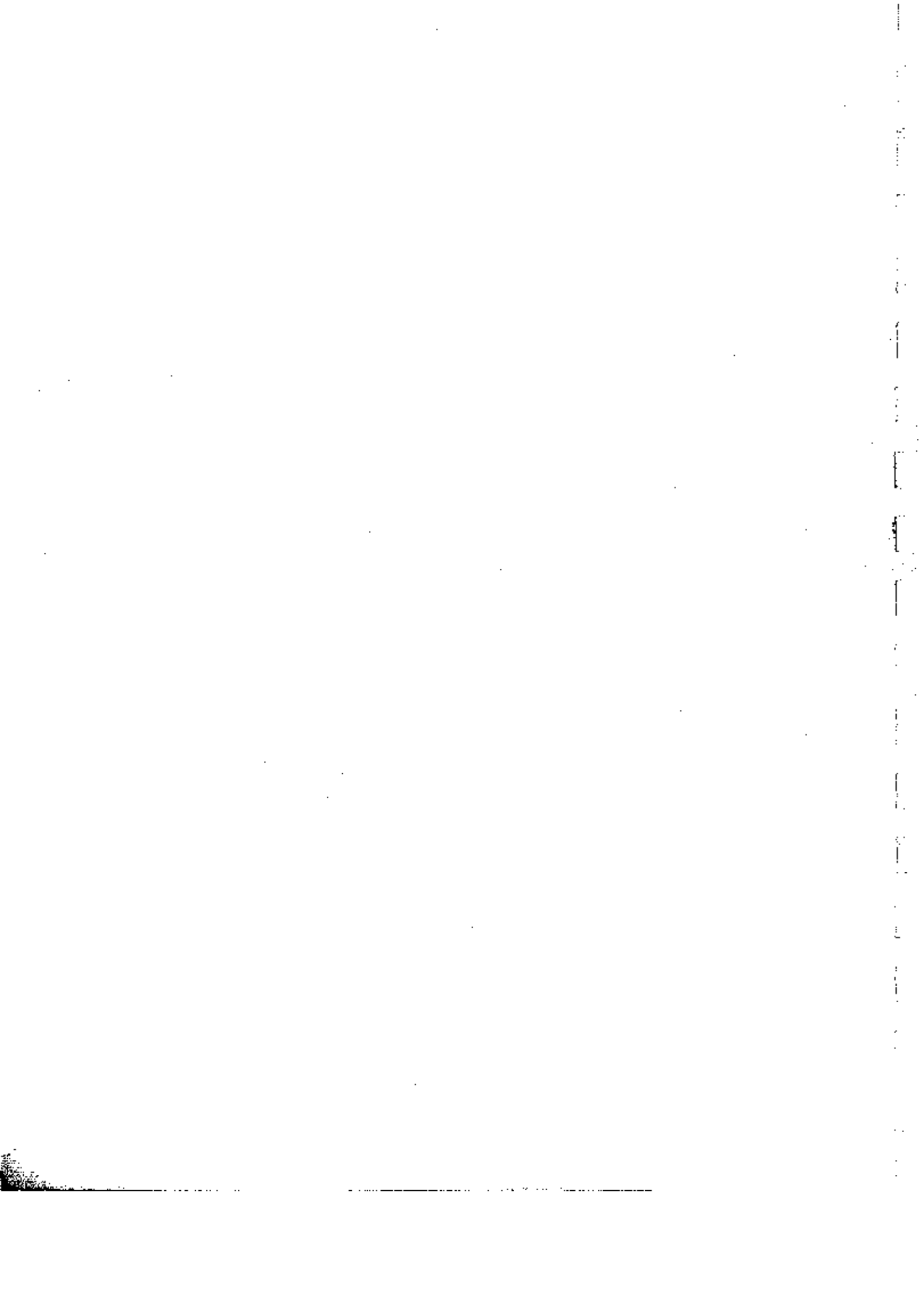
GENERATOR

STARTER

INJECTION PUMP
CALIBRATION

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GENERAL INTRODUCTION

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GENERAL PRECAUTIONS

Some recommended and standard maintenance services for your engine are mentioned in this section.

When performing maintenance on your engine be careful not to get injured by improper work.

Improper or incomplete work can cause a malfunction of the engine which may result in personal injury and/or property damage.

WARNING

When working on your engine, observe the following general precautions to prevent personal injury and/or property damage in addition to the particular NOTES or WARNINGS in the each chapter.

Most threaded fasteners are metric.

Be careful not to mix with threaded fasteners using the inch system.

- Always wear safety glasses or goggles to protect your eyes.
- Remove rings, watches, ties, loose hanging jewelry and loose clothing before starting work on the engine.
- Bind long hair securely behind the head.
- To avoid serious burns, keep yourself away from hot metal parts such as the engine, exhaust manifold, radiator, muffler, exhaust pipe and tail pipe.
- Do not smoke while working on the engine since fuel and gases from the battery are flammable.
- Take utmost care when working on the battery. It contains corrosive sulfuric acid.
- Large electric current flows through the battery cable and starter cable. Be careful not to cause a short which can result in personal injury and/or property damage.
- Always stop the engine and turn off the starter switch, unless the operation requires the engine running. Removing the key from the switch is recommended.
- Run the engine only in a well-ventilated area to avoid inhaling of carbon monoxide.
- Keep yourself, your clothing and your tools away from moving parts such as the cooling fan and V-belts when the engine is running.
- Be careful not to leave any tool in the engine compartment. The tool may be hit by moving parts and can cause personal injury.

HOW TO USE THIS WORKSHOP MANUAL.

This workshop manual is designed as a guide for servicing engine.

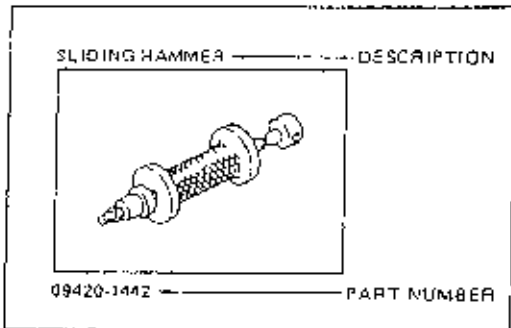
An INDEX is provided on the first page of each chapter.

TROUBLESHOOTING is dealt with each chapter.

When beginning operations, refer to the sections on for guide to appropriate diagnoses.

SPECIAL TOOLS are dealt with in each chapter.

When ordering a special tool, confirm the parts number with the applicable parts catalog.

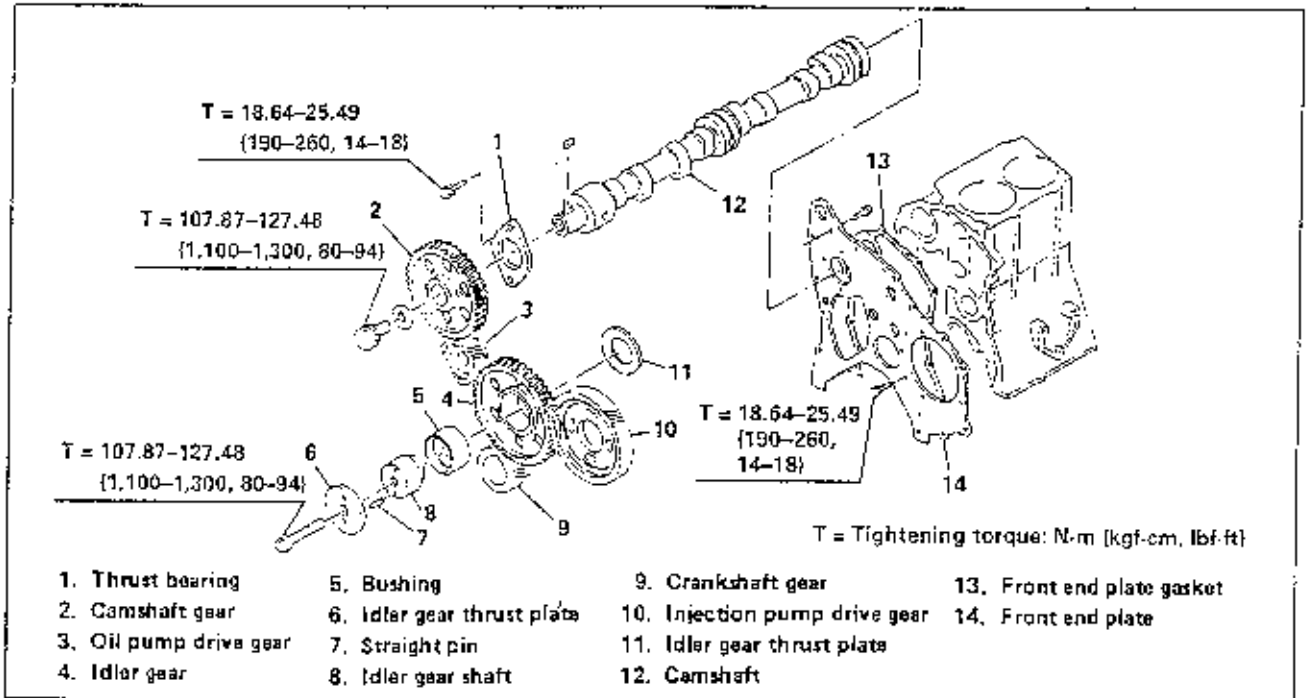


REPAIR PROCEDURES

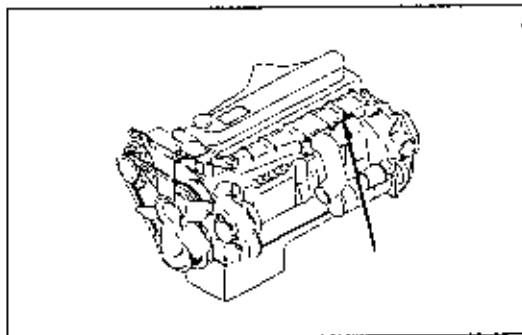
Repair procedures which are self-explanatory such as simple installation and removal of parts have been omitted. Illustrations such as the one below have been provided to make such simple procedures clear. Only essential procedures requiring directions have been dealt with explicitly.

EXAMPLE:

TIMING GEAR AND CAMSHAFT



In some cases, illustrations may be of parts which differ in some nonessential way from the parts found on your particular engine. In such cases, however, the principle or procedure being illustrated applies regardless of such non-essential differences.



IDENTIFICATION INFORMATION

ENGINE SERIAL NUMBERS

Please quote these numbers when ordering spare parts or reporting technical matter as they will give you prompt service attention.

The engine serial number is engraved on the engine cylinder block.

SPECIFICATIONS
DIESEL ENGINE FOR MARINE USE

HINO**W06D-TI**

5.759 liters, 4-cycle,
6-cyl., water-cooled,
turbocharged and intercooled

● ENGINE DESCRIPTION

- | | |
|--|---|
| 1. Max. output, pleasure craft | 187 kW (250 HP)/3,000 r/min |
| 2. Type | Diesel, 4-cycle, 6-cyl., in-line, over-head valve, water-cooled |
| 3. Aspiration | Turbocharged and intercooled |
| 4. Combustion system | Direct injection |
| 5. Cylinder | |
| Bore x Stroke | 104 x 113 mm (4.09 x 4.45 in.) |
| 6. Piston displacement | 5.759 liter (351.5 cu.in.) |
| 7. Compression ratio | 16.5 |
| 8. Direction of rotation | Counter-clockwise viewed from flywheel |
| 9. Dimensions with marine gear (L x W x H) | Approx. 1,401 x 835 x 866 mm
(55.2 x 32.9 x 34.1 in.) |
| 10. Dry weight with marine gear | Approx. 600 kg (1,323 lb) |

● FEATURES

- | | |
|---------------------|--|
| 1. Cylinder block | Mono block cast iron with replaceable dry liner |
| 2. Cylinder head | Single piece cast iron |
| 3. Crankshaft | Induction hardened die forged special steel with counter weights |
| 4. Piston and rings | Heat resistance aluminum alloy
Two compression rings, chrome plated
One oil ring, chrome plated with coil expander |
| 5. Camshaft | Induction hardened carbon steel |
| 6. Valves | Heat resistance steel |

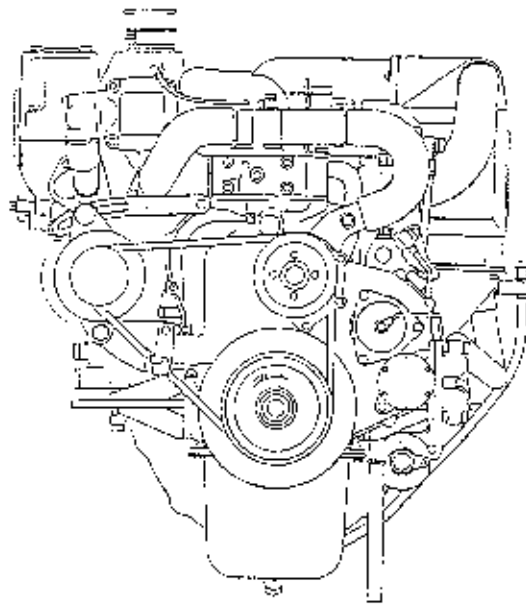
- EQUIPMENT

- ENGINE

1. Flywheel housing	SAE No. 3
2. Flywheel	SAE 11½
3. Fuel injection pump	BOSCH "A" type with all speed governor
4. Fuel filter	Paper element type
5. Water separator	Equipped
6. Lube oil pump	Full forced pressure feed by gear pump
7. Lube oil filter	Paper element type (Full flow)
8. Lube oil cooler	Multi plate type, Fresh water cooled
9. Fresh water pump	Forced-circulation by volute pump
10. Raw water pump	Self priming, Rubber impeller type
11. Intake manifold	Inlet position at rear
12. Exhaust manifold	Fresh water-cooled exhaust manifold, integrated heat exchanger with expansion tank
13. Turbocharger	Cooled by fresh water, with air cleaner
14. Intercooler	Cooled by raw water
15. Starter	12V, 2.5 KW
16. Alternator	12V, 80A, with built-in voltage regulator
17. Engine stop solenoid	Equipped
18. Emergency stop relay	Equipped
19. Starter block relay	Equipped
20. Glow plug	Equipped
21. Rigid mount bracket	Equipped
22. Exhaust riser	Cooled by raw water
23. Marine gear	Equipped

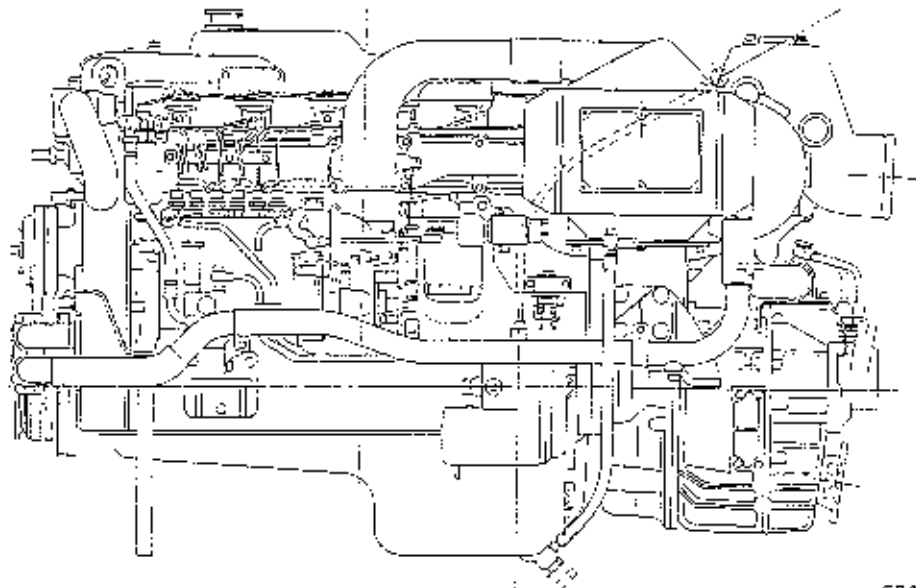
- INSTRUMENT PANEL

1. Battery switch
2. Starter switch with key
3. Instrument panel lamp switch
4. Tachometer with hourmeter
5. Coolant temperature gauge
6. Oil pressure gauge
7. Fuel gauge
8. Volt meter
9. Pre-heater indicator lamp
10. Coolant temperature warning lamp
11. Charge warning lamp
12. Oil pressure warning lamp



FRONT VIEW

F230



LEFT SIDE VIEW

F230

NOTE: These specifications are subject to change without notice.

Hino HINO MOTORS, LTD.

TOKYO, JAPAN

SPECIFICATIONS
DIESEL ENGINE FOR MARINE USE

HINO**W06D-T1-II**

5.759 liters, 4-cycle,
6-cyl., water-cooled,
turbocharged and intercooled

● ENGINE DESCRIPTION

- | | |
|---|---|
| 1. Max. output, pleasure craft | 231 kW (310 HP)/3,000 r/min |
| 2. Type | Diesel, 4-cycle, 6-cyl., in-line, over-head valve, water-cooled |
| 3. Aspiration | Turbocharged and intercooled |
| 4. Combustion system | Direct injection |
| 5. Cylinder | |
| Bore x Stroke | 104 x 113 mm (4.09 x 4.45 in.) |
| 6. Piston displacement | 5.759 liter (351.5 cu.in.) |
| 7. Compression ratio | 16.0 |
| 8. Direction of rotation | Counter-clockwise viewed from flywheel |
| 9. Dimensions without marine gear (L x W x H) | Approx. 1,448 x 835 x 804 mm
(57.0 x 32.9 x 31.6 in.) |
| 10. Dry weight without marine gear | Approx. 580 kg (1,279 lb) |

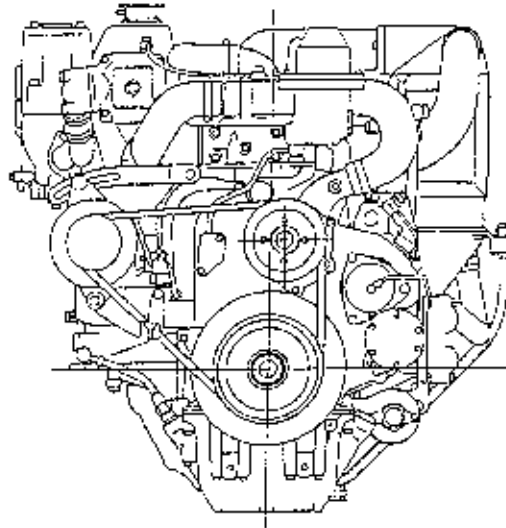
● FEATURES

- | | |
|---------------------|--|
| 1. Cylinder block | Mono block cast iron with replaceable dry liner |
| 2. Cylinder head | Single piece cast iron |
| 3. Crankshaft | Induction hardened die forged special steel with counter weights |
| 4. Piston and rings | Heat resistance aluminum alloy
Two compression rings, chrome plated
One oil ring, chrome plated with coil expander |
| 5. Camshaft | Induction hardened carbon steel |
| 6. Valves | Heat resistance steel |

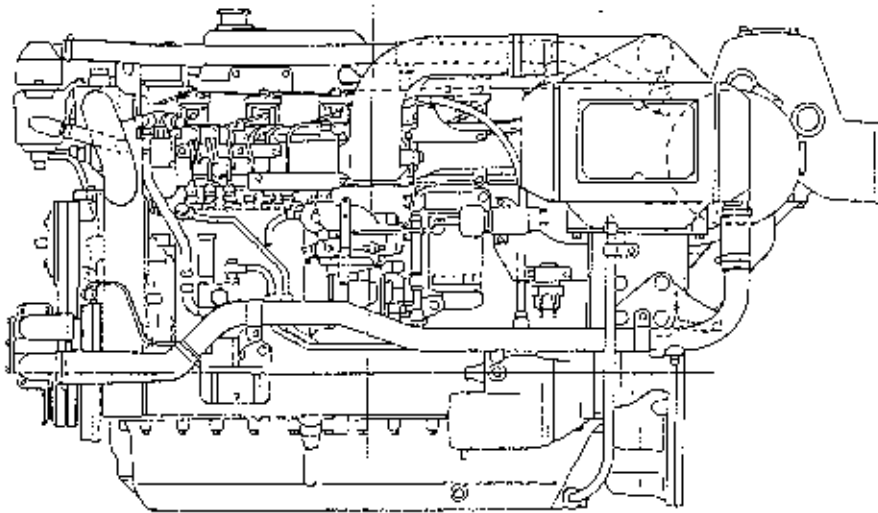
- EQUIPMENT

- ENGINE

1. Flywheel housing	SAE No. 3
2. Flywheel	SAE 11½
3. Fuel injection pump	BOSCH "AD" type with all speed governor
4. Fuel filter	Paper element type
5. Water separator	Equipped
6. Lube oil pump	Full forced pressure feed by gear pump
7. Lube oil filter	Paper element type (Full flow)
8. Lube oil cooler	Multi plate type, Fresh water cooled
9. Fresh water pump	Forced-circulation by volute pump
10. Raw water pump	Self priming, Rubber impeller type
11. Intake manifold	Inlet position at rear
12. Exhaust manifold	Fresh water-cooled exhaust manifold, integrated heat exchanger with expansion tank
13. Turbocharger	Cooled by fresh water, with air cleaner
14. Intercooler	Cooled by raw water
15. Starter	12V, 2.5 KW
16. Alternator	12V, 80A, with built-in voltage regulator
17. Engine stop solenoid	Equipped
18. Emergency stop relay	Equipped
19. Starter block relay	Equipped
20. Glow plug	Equipped
21. Rigid mount bracket	Equipped
22. Exhaust riser	Cooled by raw water
23. Marine gear	Less



FRONT VIEW



LEFT SIDE VIEW

SM3-2374

NOTE: These specifications are subject to change without notice.

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TIGHTENING TORQUE OF STANDARD BOLT

Bolt identification	Tightening conditions	Bolt diameter (mm)	Unit: N·m (kgf·m)										
			4	5	6	8	10	12	14	16	18	20	22
4	Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	1.26 - 1.56 14 - 20 1.1 - 1.47	0.59 - 1.47 10 - 15 0.5 - 1.0	2.64 - 3.19 36 - 53 2.7 - 3.6	8.63 - 12.55 88 - 128 7 - 9	17.17 - 25.00 174 - 235 15 - 19	29.02 - 43.63 309 - 445 22 - 37	47.67 - 69.62 488 - 712 59 - 81	71.34 - 108.85 766 - 1,119 55 - 81	101.89 - 150.81 1,040 - 1,530 78 - 113	143.14 - 212.81 1,480 - 2,118 100 - 146	193.08 - 282.23 2,030 - 2,930 147 - 215	251.08 - 367.14 2,660 - 3,760 196 - 271
			Cast iron or aluminum tightening surface. Washers. Medium conditions.	3.71 - 6.96 48 - 71 3.5 - 5.1	11.49 - 16.85 111 - 172 9 - 17	22.18 - 34.34 232 - 340 17 - 24	39.17 - 58.05 405 - 592 30 - 47	58.95 - 93.16 647 - 950 47 - 68	89.04 - 145.12 1,010 - 1,483 73 - 107	138.22 - 203.05 1,580 - 2,300 101 - 147	193.23 - 284.39 2,040 - 2,940 143 - 208	264.78 - 388.32 2,710 - 3,970 198 - 287	353.75 - 535.00 3,740 - 5,400 271 - 397
5	Tightening area having black coarse surface. Rusty. Naked bolt or lubricant unavailable. Poor tightening conditions.	1.67 - 2.45 17 - 26 1.3 - 1.8	5.89 - 8.62 63 - 96 4 - 6.5	14.02 - 20.98 146 - 214 11 - 15	29.44 - 43.67 290 - 426 21 - 30	45.63 - 72.76 506 - 747 37 - 53	70.34 - 115.71 808 - 1,180 59 - 85	123.57 - 181.42 1,260 - 1,850 92 - 133	170.64 - 249.03 1,740 - 2,540 125 - 183	243.75 - 355.00 2,460 - 3,630 178 - 261	331.47 - 495.12 3,330 - 4,930 243 - 351	440.12 - 645.81 4,420 - 6,450 318 - 462	
			Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	1.57 - 2.35 16 - 24 1.2 - 1.7	5.69 - 8.13 58 - 83 4.2 - 6.0	13.51 - 19.71 136 - 201 10 - 14	26.76 - 39.22 275 - 400 20 - 28	46.78 - 68.14 477 - 708 35 - 50	74.93 - 109.63 783 - 1,120 55 - 81	116.70 - 171.63 1,180 - 1,740 87 - 126	160.92 - 236.35 1,640 - 2,400 113 - 173	221.52 - 324.40 2,240 - 3,410 160 - 246	311.36 - 458.95 3,140 - 4,630 231 - 336
6	Cast iron or aluminum tightening surface. Washers. Medium conditions.	2.16 - 3.19 22 - 32 1.6 - 2.3	7.58 - 10.78 75 - 110 5.5 - 7.5	17.55 - 26.47 183 - 270 14 - 19	35.70 - 52.26 364 - 533 27 - 38	62.04 - 91.35 636 - 932 47 - 67	106.05 - 147.69 1,020 - 1,500 74 - 103	155.59 - 226.45 1,550 - 2,200 116 - 163	213.79 - 313.81 2,100 - 3,200 156 - 231	284.61 - 446.20 2,800 - 4,200 200 - 290	381.47 - 557.01 3,800 - 5,600 278 - 406	508.09 - 735.82 5,080 - 7,350 368 - 537	
			Tightening area having black coarse surface. Rusty. Naked bolt or lubricant unavailable. Poor tightening conditions.	2.65 - 3.62 27 - 40 2.0 - 2.9	9.22 - 13.53 94 - 134 6.8 - 9.9	22.16 - 32.85 229 - 336 17 - 26	44.63 - 66.41 455 - 681 33 - 48	77.97 - 114.24 795 - 1,148 58 - 84	124.55 - 183.38 1,210 - 1,770 87 - 126	176.15 - 260.29 1,750 - 2,520 124 - 171	237.73 - 357.01 2,320 - 3,480 171 - 259	319.52 - 476.20 3,180 - 4,760 231 - 336	426.20 - 625.81 4,260 - 6,250 311 - 450
7	Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	2.36 - 3.13 24 - 32 1.9 - 2.3	3.05 - 10.76 82 - 110 6.0 - 7.9	9.63 - 26.16 200 - 267 15 - 19	18.94 - 36.75 337 - 574 25 - 41	36.08 - 60.71 384 - 595 51 - 86	59.05 - 106.13 510 - 810 74 - 107	85.66 - 146.53 730 - 1,230 126 - 167	125.40 - 216.33 1,100 - 2,100 173 - 239	173.40 - 301.47 1,500 - 2,500 244 - 326	231.47 - 407.27 2,000 - 3,500 301 - 410	301.47 - 508.09 2,600 - 4,300 385 - 564	
			Cast iron or aluminum tightening surface. Washers. Medium conditions.	3.14 - 4.11 32 - 42 2.4 - 3.0	10.79 - 18.31 110 - 141 8.0 - 10.5	21.49 - 36.27 267 - 366 19 - 26	41.69 - 66.27 429 - 706 33 - 43	68.15 - 126.62 608 - 925 83 - 147	106.13 - 181.42 920 - 1,380 103 - 147	146.53 - 246.45 1,300 - 2,000 166 - 222	203.40 - 341.47 1,700 - 2,800 230 - 305	276.47 - 476.20 2,400 - 3,900 301 - 410	368.09 - 608.09 3,200 - 5,100 385 - 564
8	Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	3.82 - 5.39 40 - 53 2.9 - 3.8	11.40 - 17.84 157 - 263 10.0 - 13.7	32.76 - 47.60 334 - 465 25 - 32	64.95 - 88.49 662 - 941 48 - 63	113.76 - 161.62 1074 - 1540 84 - 111	167.43 - 242.23 1,650 - 2,400 124 - 171	236.42 - 377.55 2,300 - 3,650 171 - 239	317.55 - 481.42 3,070 - 4,760 228 - 316	426.20 - 625.81 4,000 - 5,900 290 - 410	568.09 - 835.82 5,300 - 7,700 385 - 564	750.00 - 1,017.61 7,000 - 10,000 508 - 714	
			Cast iron or aluminum tightening surface. Washers. Medium conditions.	11.40 - 17.84 157 - 263 10.0 - 13.7	32.76 - 47.60 334 - 465 25 - 32	64.95 - 88.49 662 - 941 48 - 63	113.76 - 161.62 1,074 - 1,540 84 - 111	167.43 - 242.23 1,650 - 2,400 124 - 171	236.42 - 377.55 2,300 - 3,650 171 - 239	317.55 - 481.42 3,070 - 4,760 228 - 316	426.20 - 625.81 4,000 - 5,900 290 - 410	568.09 - 835.82 5,300 - 7,700 385 - 564	750.00 - 1,017.61 7,000 - 10,000 508 - 714

NOTE: The torque values given in this table should be applied when the bolt torque is not specified.

CHAPTER EN

ENGINE

Model W06D-TI and W06D-TI-II

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Hino W06d W06d T1 Diesel Marine Engine Workshop Service Repair Manual

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