YANMAR

0000A0A1015-9112

SERVICE MANUAL

MARINE DIESEL ENGINE

3JH2 Series

2000. 3. 10

YANMAR

SERVICE MANUAL

MARINE DIESEL ENGINE

MODEL 3JH2 series

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History of Revision				Page No	1
Manual Name		Service Manual for Marine Diesel Engine			
Engine Model :		**3JH2 series**			
Number of revision	Date of revision	Reason for correction	Outline of correction	Correction item No. (page)	Corrected by
1st	Apr. 2001	● Crank shaft V-pulley bolt tightening torque	● Added the standard V-pulley (material: casting iron) tightening torque and general use nuts & bolts tightening torque.	10-32	Quality Assurance Dept.
		● Clutch lever control cable connectlion.	● Added the tightening torque of nut for the remote control cable connection of clutch shifting lever.	8-3	
			● Injection timing changed.	1-3, 10-31	
2nd	Feb. 2003	● Add the model 3JH25A & 3JH30A	● Added the Exterior Views ● Added the Specifieations ● Added the Engine Outiine ● Added the Pertomance Curves ● Added the Piping Diagrams ● Added the Fuel Injection Pump Sewice Data ● Added the Intake and Exhaust System figure ● Added the Lubrieation System figure ● Added the Lube Oil Filter figure ● Added theSea water line flgure ● Added the Marine Gear Models KM3P1,KM3P3,KM35P1 ● Added the Wiring diagrams	1-2-1, 1-2-2 1-3-1, 1-4-1 1-8-1 1-11-1, 1-11-2 1-14-1 3-1-1 4-1-1 5-2-1 5-6-1 6-3-1 7-29~7-56 9-4-1	Quality Assurance Dept.

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CHAPTER 1

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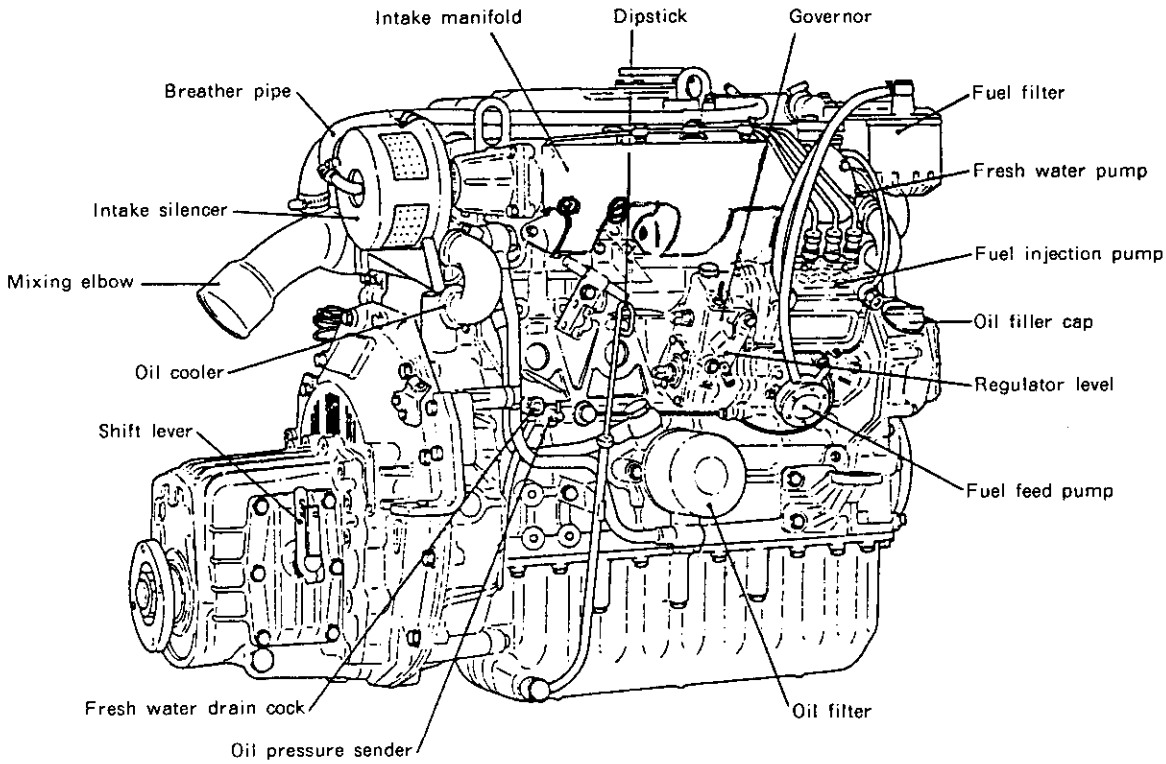
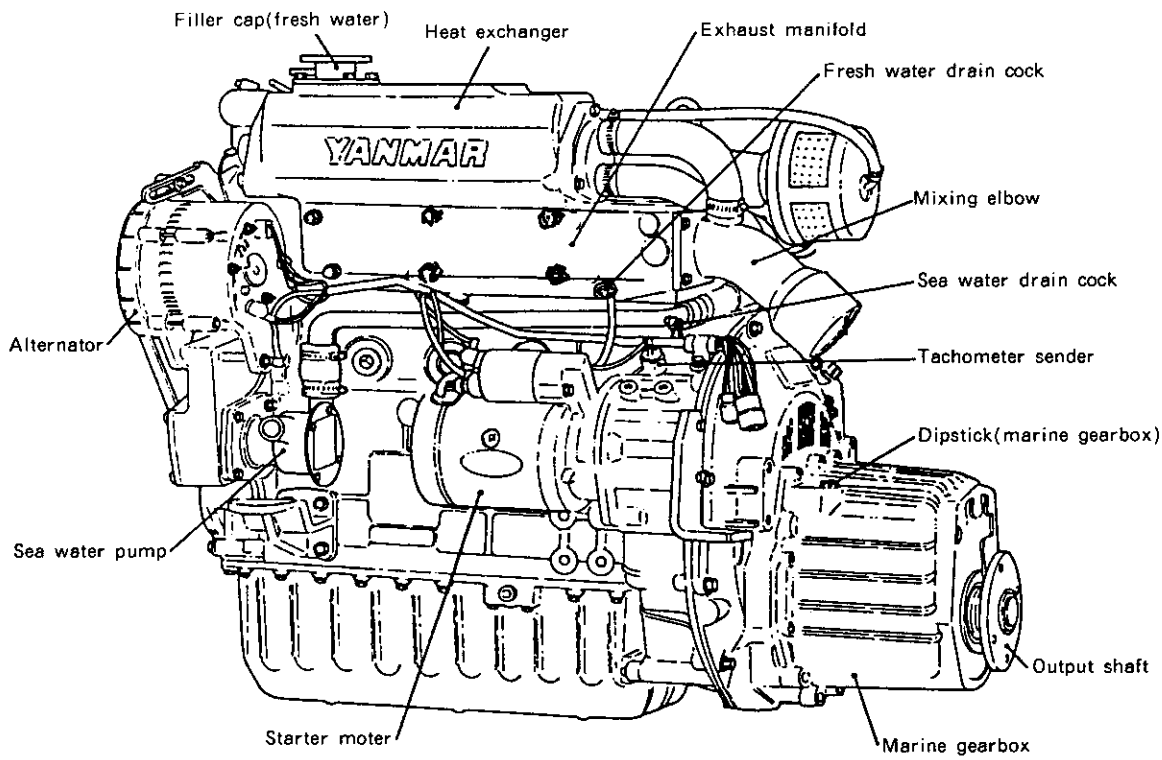
1. Exterior Views

1-1. 3JH2E





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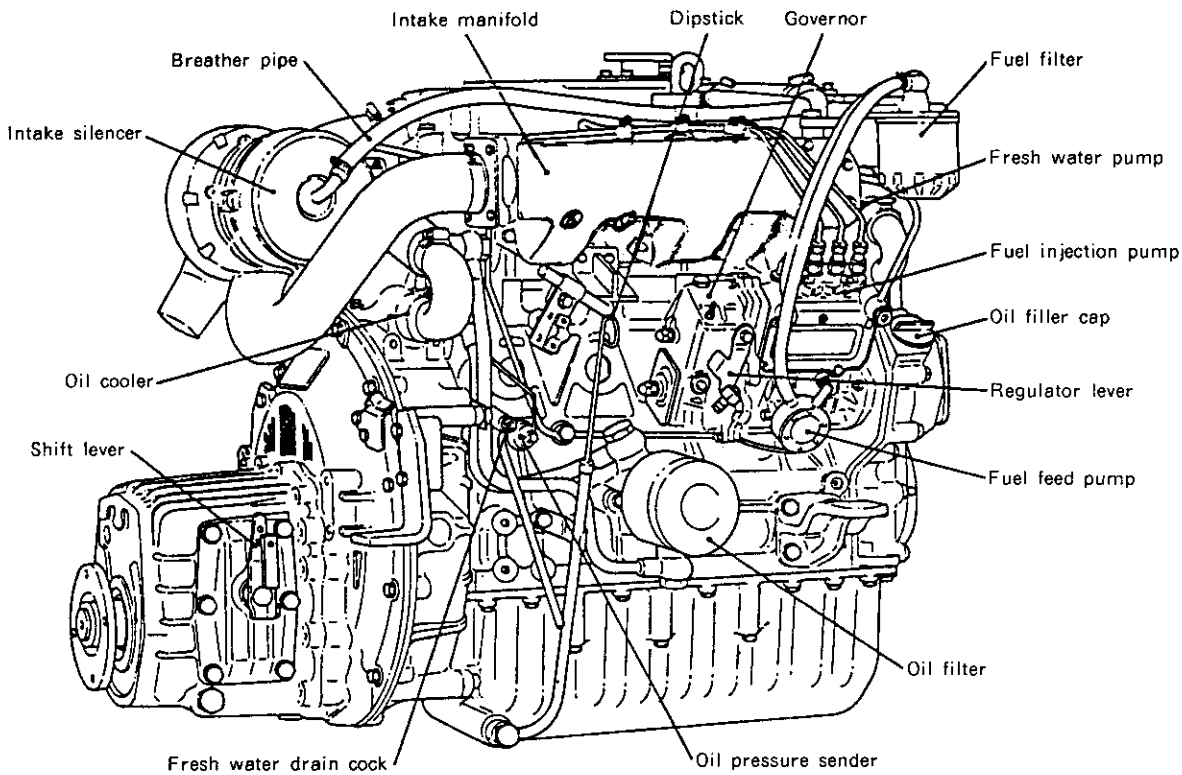
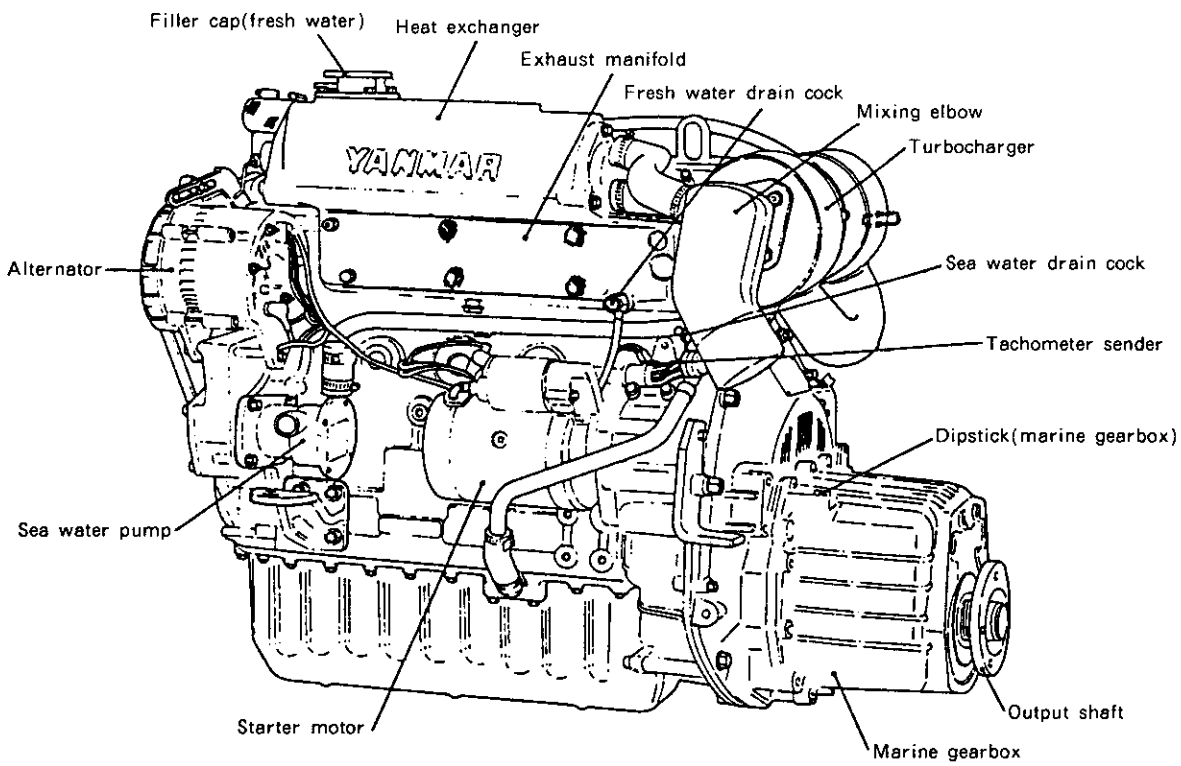
1-2. 3JH2-TE





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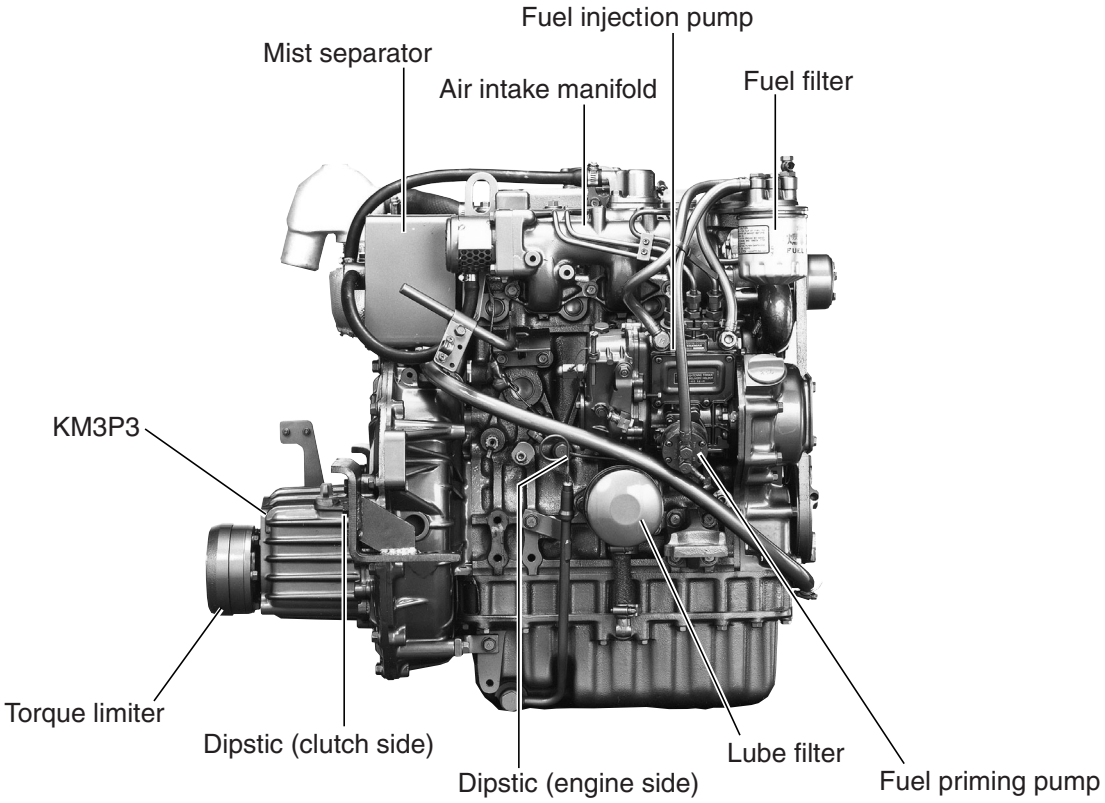
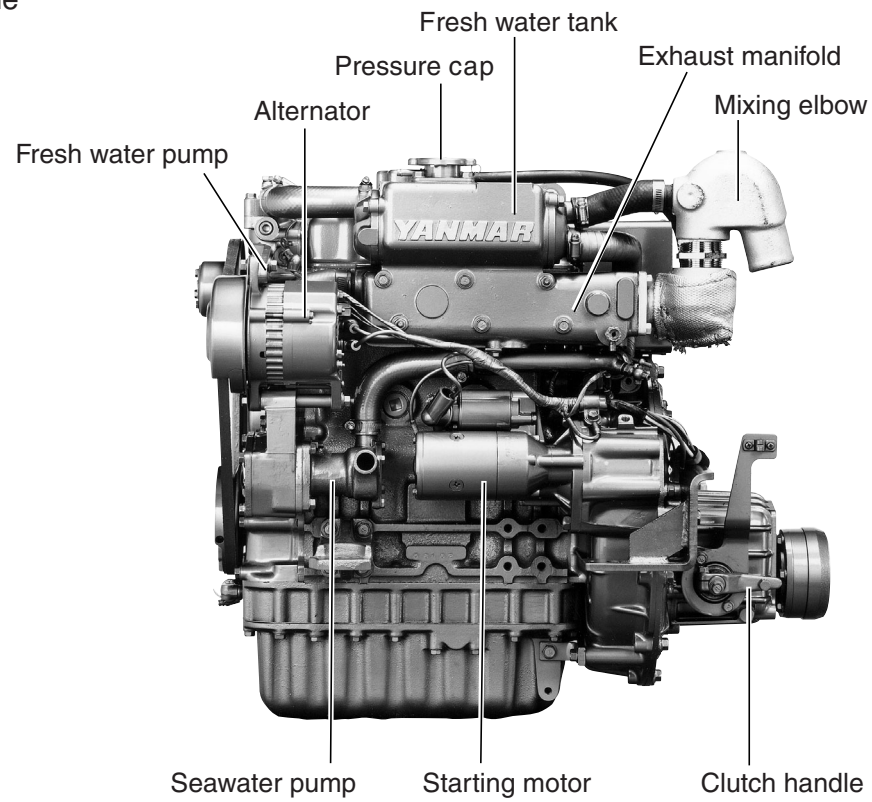
1-3 3JH25A/30A

With KM3P3

- Operating side

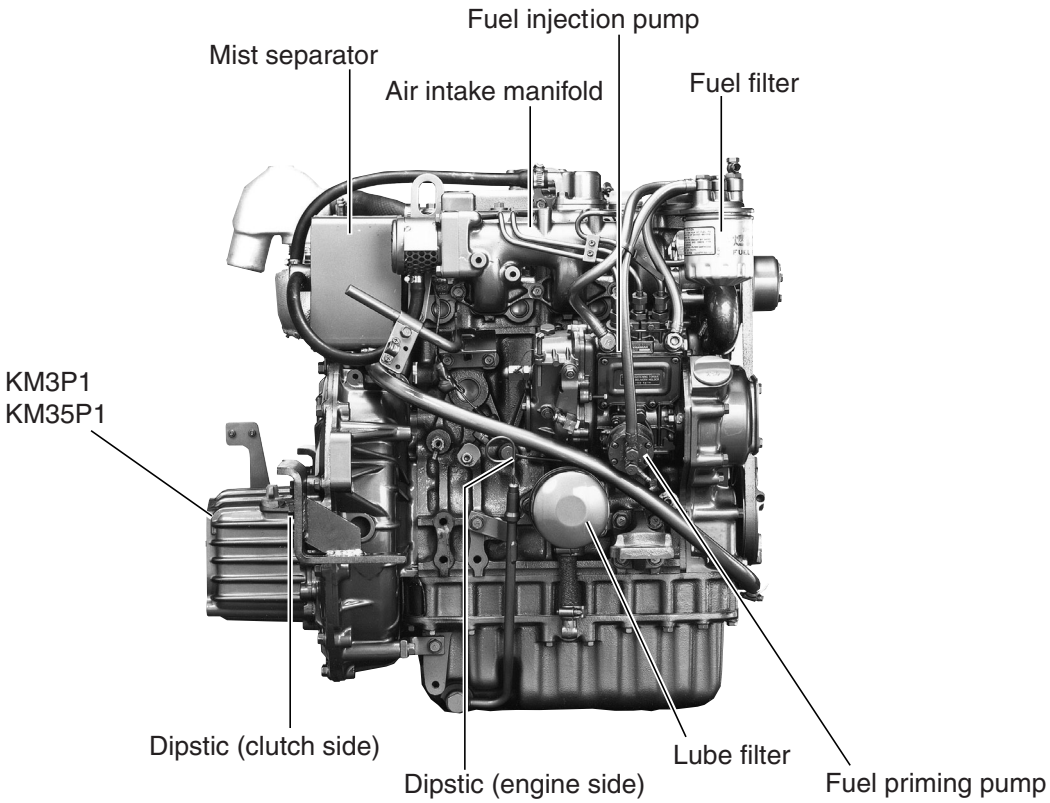


- Non-Operating side

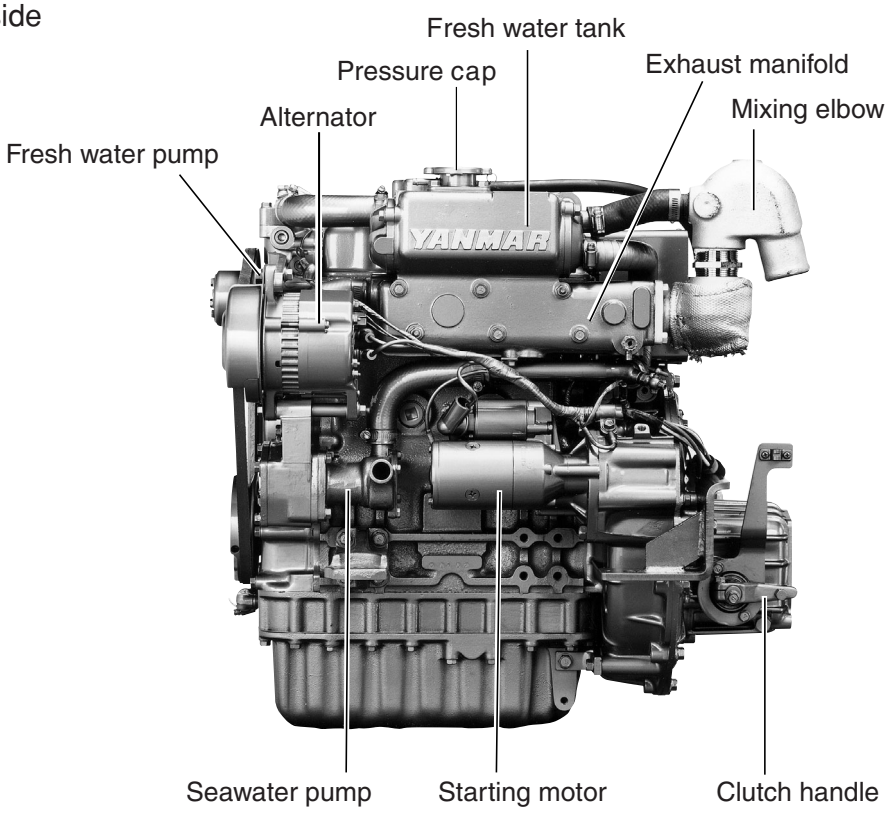


With KM3P1/ KM35P1

● Operating side



● Non-Operating side



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2. Specifications

2-1. Engine

Model			3JH2-(B)E	3JH2-T(B)E
Type			Vertical 4-cycle water cooled diesel engine	
Combustion system			Direct injection	
Aspiration			Normal aspiration	Exhaust gas turbocharger
Number of cylinders			3	
Bore × stroke		mm (in.)	82 × 86 (3.23 × 3.39)	
Displacement		ℓ (cu.in.)	1.363 (83.17)	
One hour rating output (DIN6270B) flywheel output	Output/crankshaft speed	kW/rpm (HP/rpm)	28.5/3600 (38.7/3600)	35.0/3600 (47.6/3600)
	Brake mean effective pressure	kgf/cm² (lb./in²)	6.97 (99.113)	8.62 (122.576)
	Piston speed	m/sec. (ft./sec.)	10.3	
Continuous rating output (DIN6270A) flywheel output	Output/crankshaft speed	kW/rpm (HP/rpm)	25.7/3400 (34.9/3400)	31.6/3400 (43.0/3400)
	Brake mean effective pressure	kgf/cm² (lb./in²)	6.80 (96.696)	8.35 (118.737)
	Piston speed	m/sec. (ft./sec.)	9.75	
Compression ratio			18.1	18.0
Fire order			1 — 240° — 3 — 240° — 2 — 240° — 1	
Fuel injection pump			YPES-CL	
Fuel injection timing (b.T.D.C.)		degree	14°	17°
Fuel injection pressure		kgf/cm²(lb./in².)	200±5 (19.6±0.5)	
Fuel injection nozzle			Hole type	
Direction of rotaion	(Crankshaft)		Counter-clock wise viewed from stern	
Power take off			At Flywheel side	
Cooling system			Constant high temperature fresh water cooling Fresh water : Centrifugal pump Sea water : Rubber impeller pump	
Lubrication system			Forced lubrication with trochoid pump	
Starting system	Starting motor		DC 12V 1.4kW	
	AC generator		12V 55A (12V 80A : Option)	
Turbocharger	Type		—	RHB52 (I.H.I.)
	Model		—	—
	Cooling system		—	Water cooling
Air cooler system	Type		—	—
	Radiation area	m² (in²)	—	—
Dimensions (with KMA)	Overall length	mm (in.)	760.2 (3JH2BE) / 782.3(3JH2E)	760.2 (29.93) / 782.3 (30.84)
	Overall width	mm (in.)	511.5	511.5 (20.65)
	Overall height	mm (in.)	587.5	587.5 (23.13)
Engine weight without marine gear (dry)		kg (lb.)	165	174
Lubricating oil capacity Effect/max.		ℓ (cu.in.)	2.1 / 4.9	
Cooling water capacity (Fresh water)	Fresh water tank	ℓ (cu.in.)	4.7	
	Sub tank	ℓ (cu.in.)	0.8 (48.82)	

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Model		Unit	3JH25A	3JH30A
Type		——	Vertical 4-cycle water cooled diesel engine	
Combustion system		——	Direct injection	
Aspiration		——	Normal aspiration	
Number of cylinders		——	3	
Bore × stroke		mm	82 × 86	
Displ acement		ℓ	1.303	
One hour rating output (DIN6270B) flywheel output	Output/crankshaft speed	kW(PS)/rpm	20.2/3300 (27.5/3300)	24.3/3000 (33.0/3000)
	Brake mean effective pressure	MPa(kgf/cm^2)	0.539 (5.50)	0.713 (7.27)
	Piston speed	m/sec.	9.5	8.6
Continuous rating output (DIN6270A) flywheel output	Output/crankshaft speed	kW(PS)/rpm	18.4/3200 (25/3200)	22.1/2900 (30/2900)
	Brake mean effective pressure	MPa(kgf/cm^2)	0.506 (5.016)	0.670 (6.83)
	Piston speed	m/sec.	9.2	8.3
Compression ratio		——	18.1	
Fire order		——	1 — 3 — 2 — 1	
Fuel injection pump		——	YPES-CL	
Fuel injection timing (b.T.D.C.)		degree.	19±1	
Fuel injection pressure		MPa(kgf/cm^2)	19.6±0.5(200±5)	
Fuel injection nozzle		——	Hole type	
Direction of rotaion	(Crankshaft)	——	Counter-clock wise viewed from stern	
Power taka off		——	At Flywheel side	
Cooling system		——	Constant high temperature fresh water cooling Fresh water : Centrifugal pump See water : Rubber impeller pump	
Lubrication system		——	Forced lubrication with trochoid pump	
Starting system	Starting motor	V-kW	DC 12V-1.8kW	
	AC generator	V-A	12V-35A	
Dimensions (with KM35P1)	Overall length	mm	730	770
	Overall width	mm	545	
	Overall height	mm	680	
Engine weight without marine gear (dry)		kg	185	190
Lubricating oi l capacity Effect/max.		ℓ	0.9 / 7.0	
Cooling water capacity (Fresh water)	Fresh water tank	ℓ	4.4	
	Sub tank	ℓ	0.8	

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2-2. Marine Gear

Marine gear system	Model		KBW-10E		KM3A		
	Type		Multiple friction disc cluth (Parallel drive)		Cone clutch (Angle drive)		
	Reduction ratio (Forward/Reverse)		2.14/2.50	2.45/2.50	2.33/3.04	2.64/3.04	3.21/3.04
	Direction of rotation (Forward) viewed from stern		Clock wise		Clock wise		
	Lubricating oil capacity Effect/max.	ℓ (cu.in.)	0.2/0.7 (12.204/42.714)		0.05/0.35 (3.051/21.357)		
	Lubricating oil						
	weight	kg (lb.)	17.5 (38.588)		13 (28.665)		

2-3. Applicability of Marine gear & Reduction ratio

●: Standard combination
○: Optional combination
×: Inapplicable

Marine gear / Engine model			3JH2F	3JH2-TE
Model	Reduction ratio	I.D Mark		
KBW10E	2.14	S	●	●
	2.45	G	●	●
	2.83	GG	●	×
KM3A	2.33	S	●	●
	2.64	G	●	●
	3.21	GG	●	×

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marine gear system	Model		KM3P1	KM3P3	KM35P1
	Clutch Type		Cone clutch		
	Reduction ratio (Forward/Reverse)		2.36 / 3.1 6		
	Direction of rotation(Forward) viewed from stern		Clock wise		
	Lubricating oil capacity min/max	ℓ	0.3 / 0.35		0.45 / 0.5
	Lubricating oil		SAE #30 API CC or CD		
	mas	kg	12	15	12
	Torque limiter		Not Eqipped	Eqipped	Eqipped

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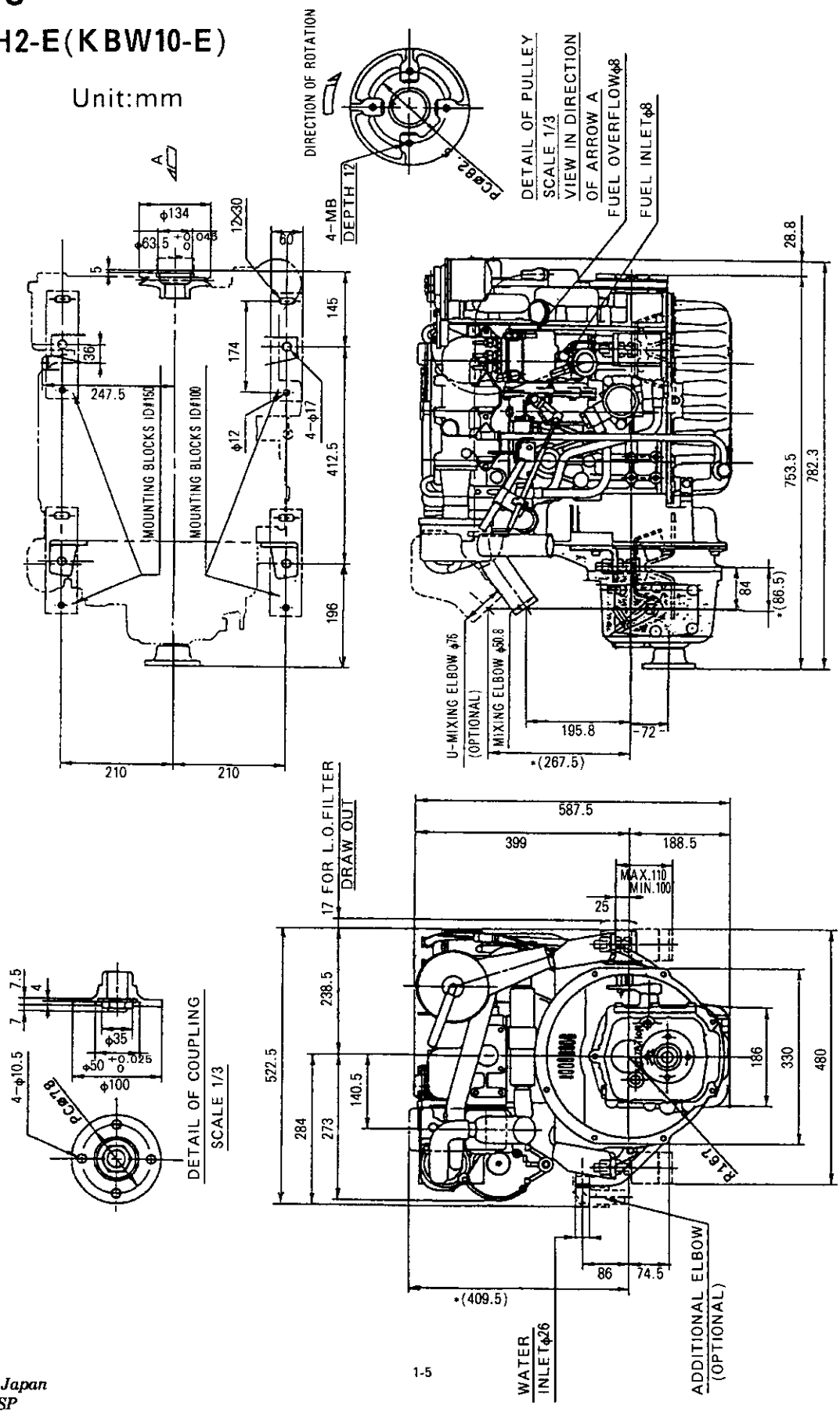
3. Engine Outline

3-1. 3JH2-E(KBW10-E)

Unit:mm



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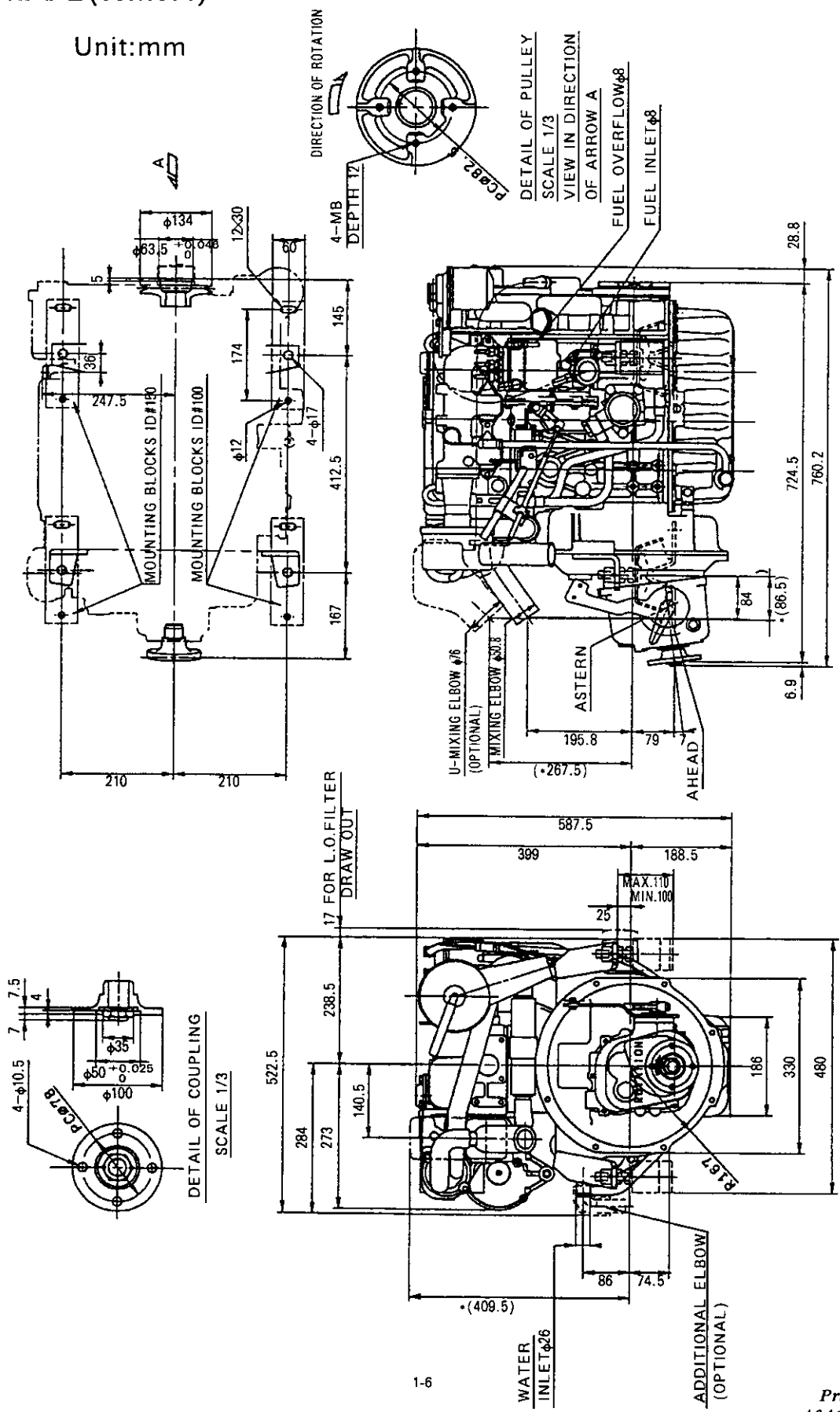
3-2. 3JH2-BE(KM3A)

Unit:mm



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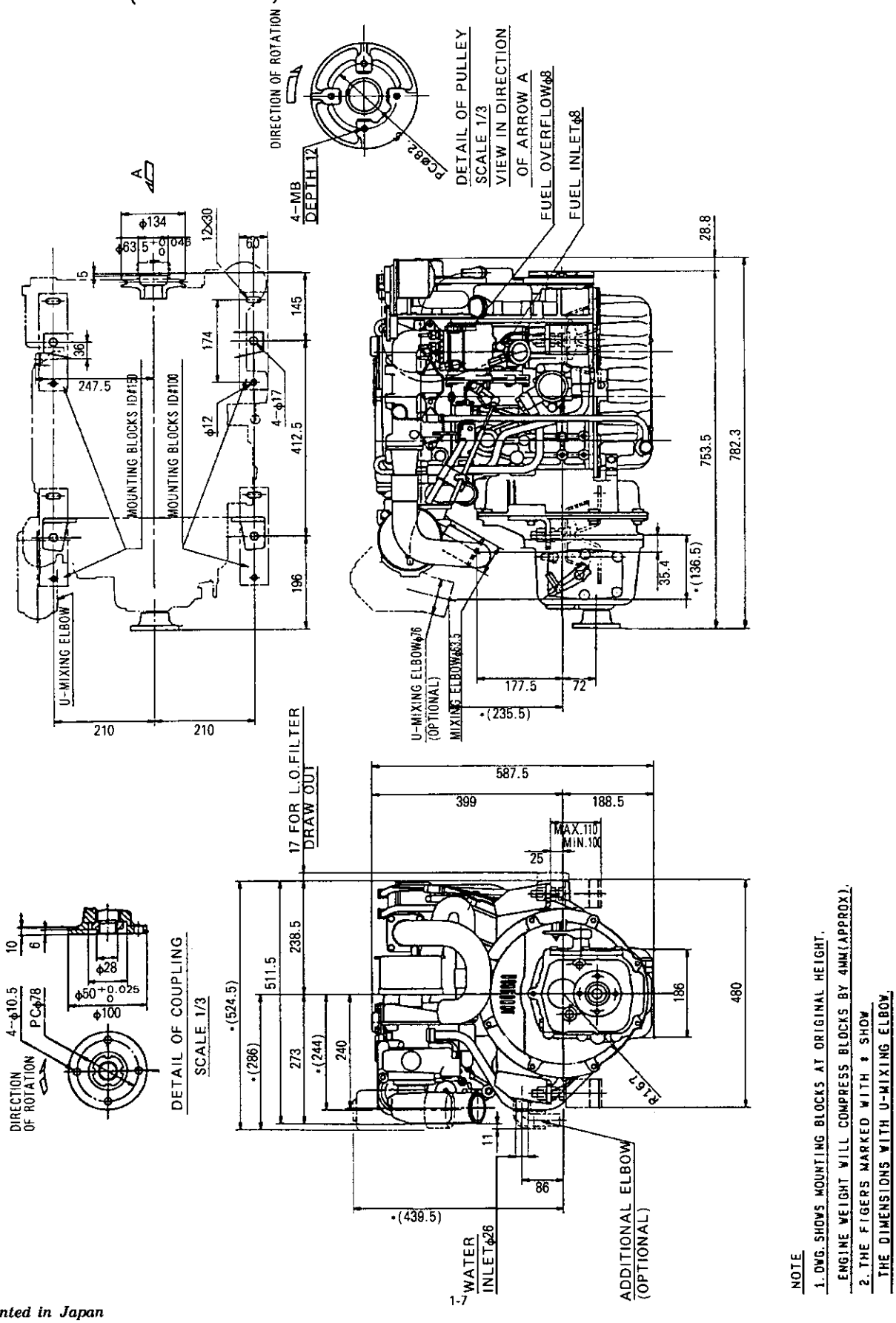
3-3. 3JH2TE(KBW10-E)



NOTE
1. DWG. SHOWS MOUNTING BLOCKS AT ORIGINAL HEIGHT.
ENGINE WEIGHT WILL COMPRESS BLOCKS BY 4MM(APPROX).
2. THE FIGERS MARKED WITH * SHOW
THE DIMENSIONS WITH U-MIXING ELBOW.

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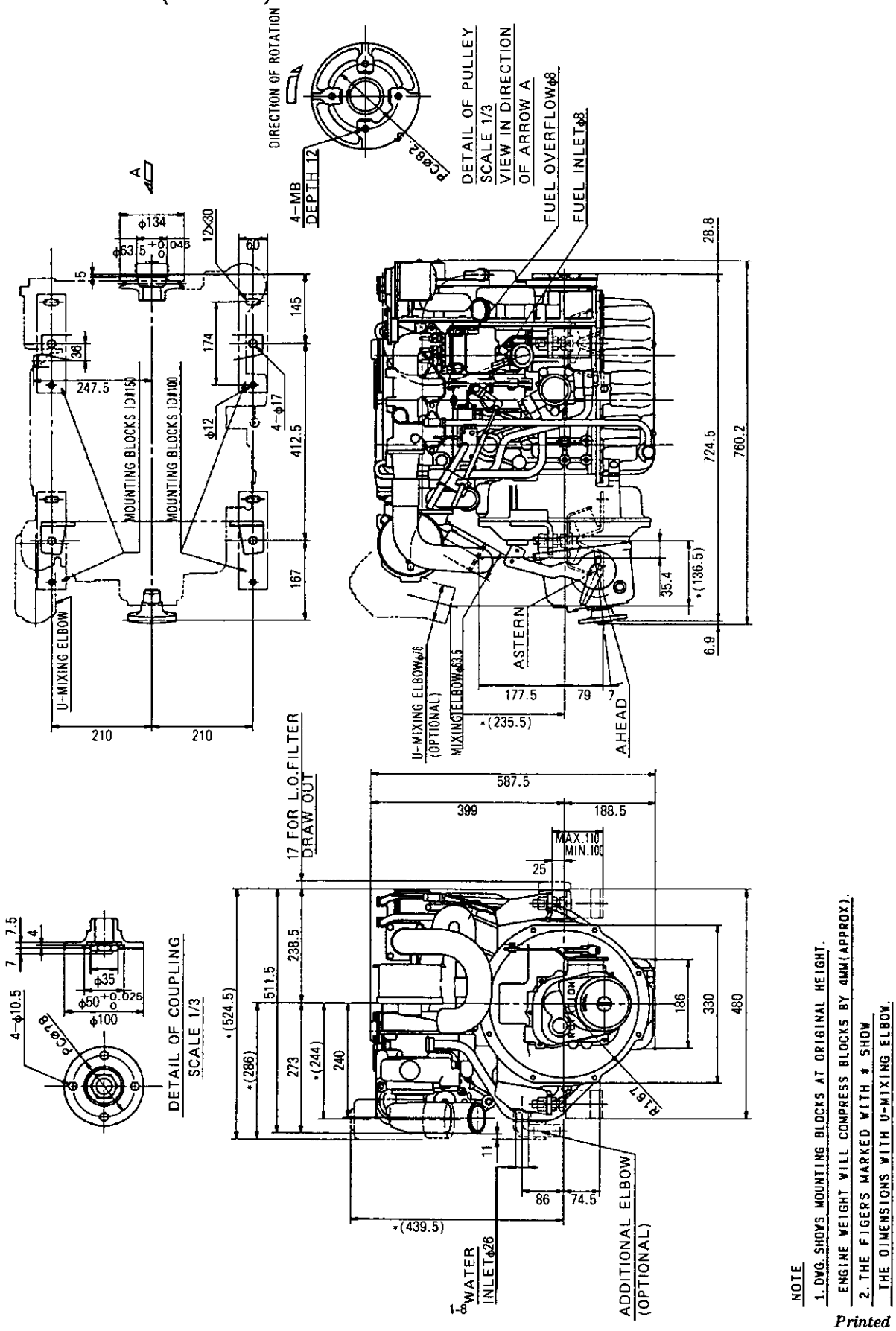
3-4. 3JH2-TBE(KM3A)



NOTE
1. DWG. SHOWS MOUNTING BLOCKS AT ORIGINAL HEIGHT. ENGINE WEIGHT WILL COMPRESS BLOCKS BY 4MM(APPROX).
2. THE FIGERS MARKED WITH * SHOW THE DIMENSIONS WITH U-MIXING ELBOW.

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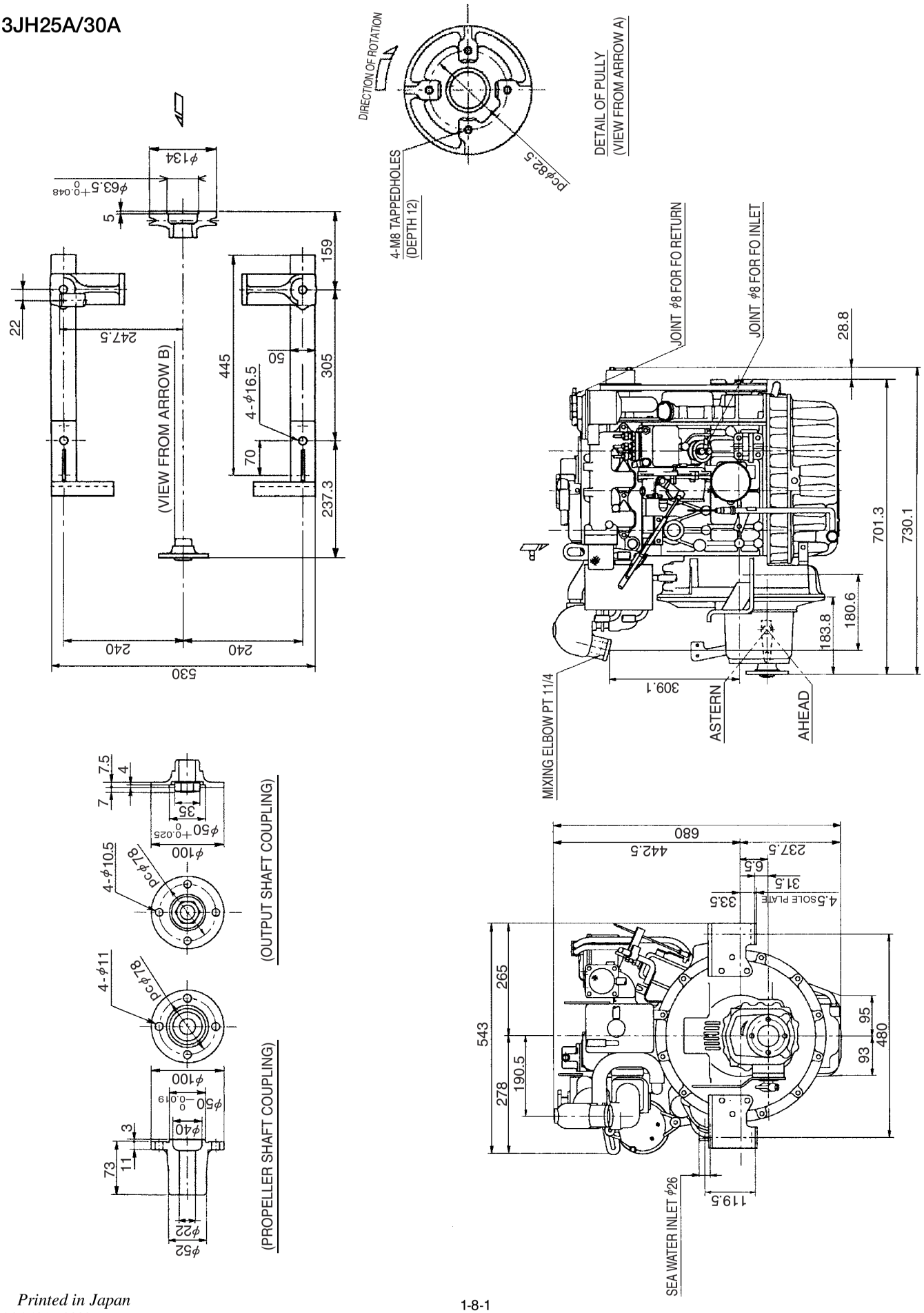
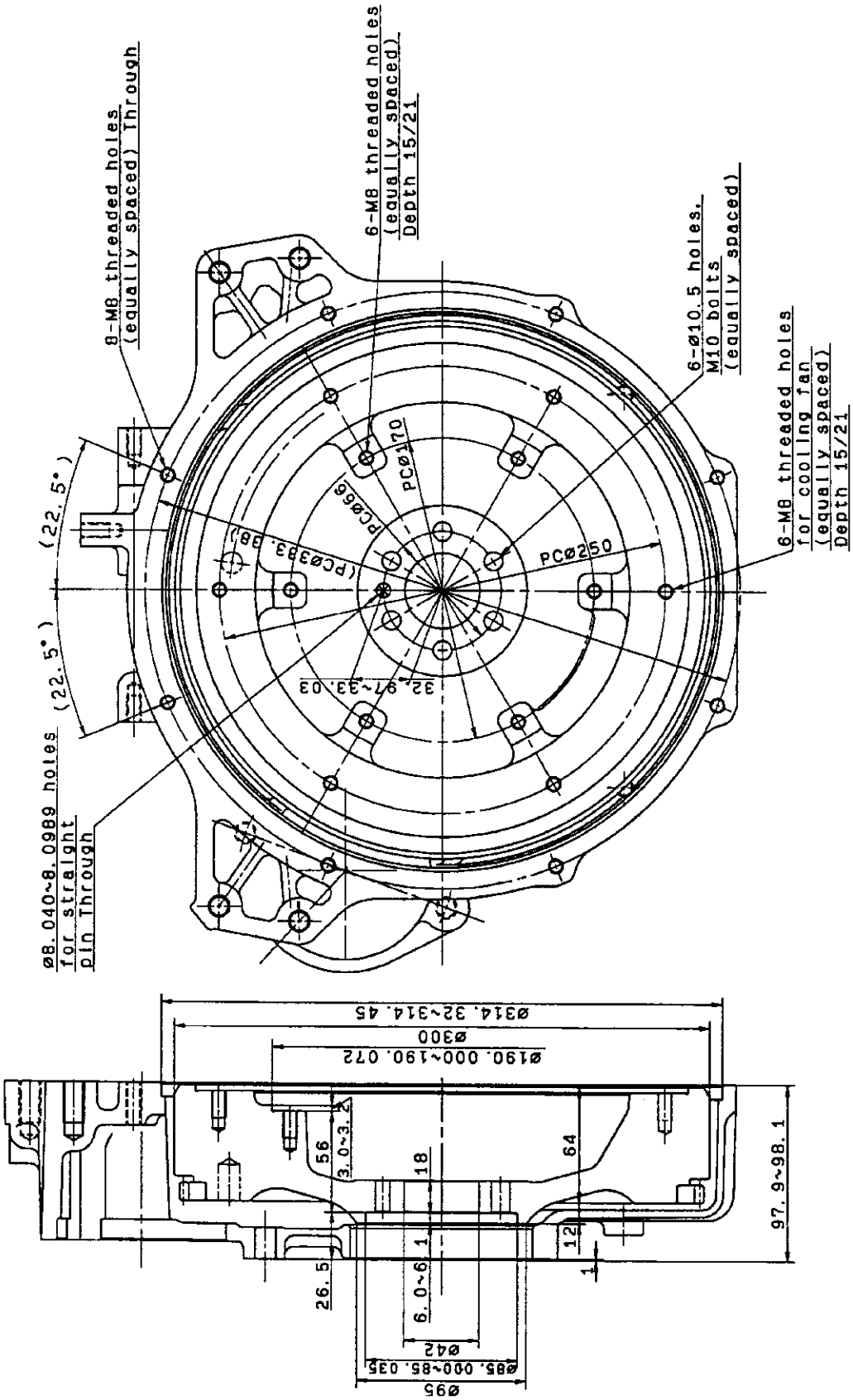
3JH25A/30A


DIRECTION OF ROTATION
4-M8 TAPPEDHOLES (DEPTH 12)
PCD82.5
DETAIL OF PULLY (VIEW FROM ARROW A)
JOINT φ8 FOR FO RETURN
JOINT φ8 FOR FO INLET
28.8
701.3
730.1
180.6
183.8
309.1
ASTERN
AHEAD
MIXING ELBOW PT 11/4
φ134
φ63.5
5
159
22
247.5
(VIEW FROM ARROW B)
445
50
305
4-φ16.5
70
237.3
240
240
530
7.5
4
7
35
φ50
φ100
4-φ10.5
PCDφ78
4-φ11
PCDφ78
(OUTPUT SHAFT COUPLING)
φ100
φ50
φ40
3
73
11
φ52
φ22
(PROPELLER SHAFT COUPLING)
680
442.5
237.5
6.5
31.5
33.5
4.5SOLE PLATE
543
265
278
190.5
95
93
480
119.5
SEA WATER INLET φ26

3-5. Dimensions of flywheel



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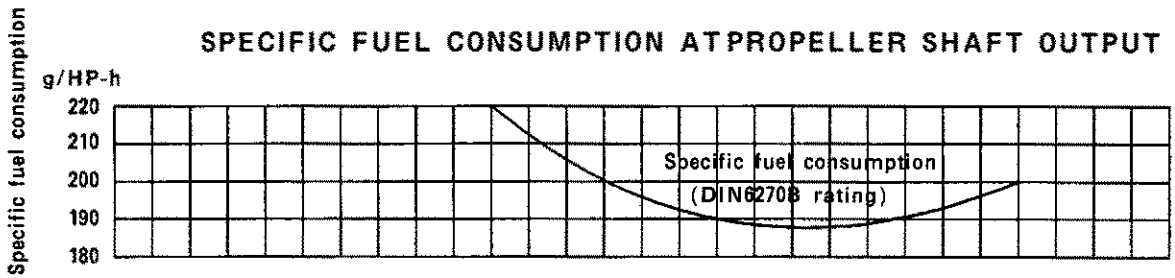
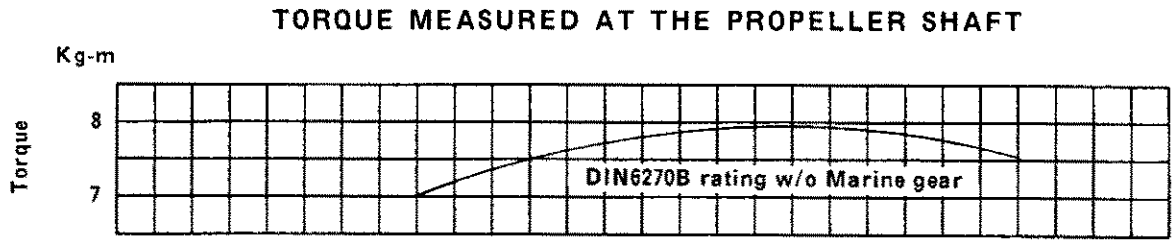
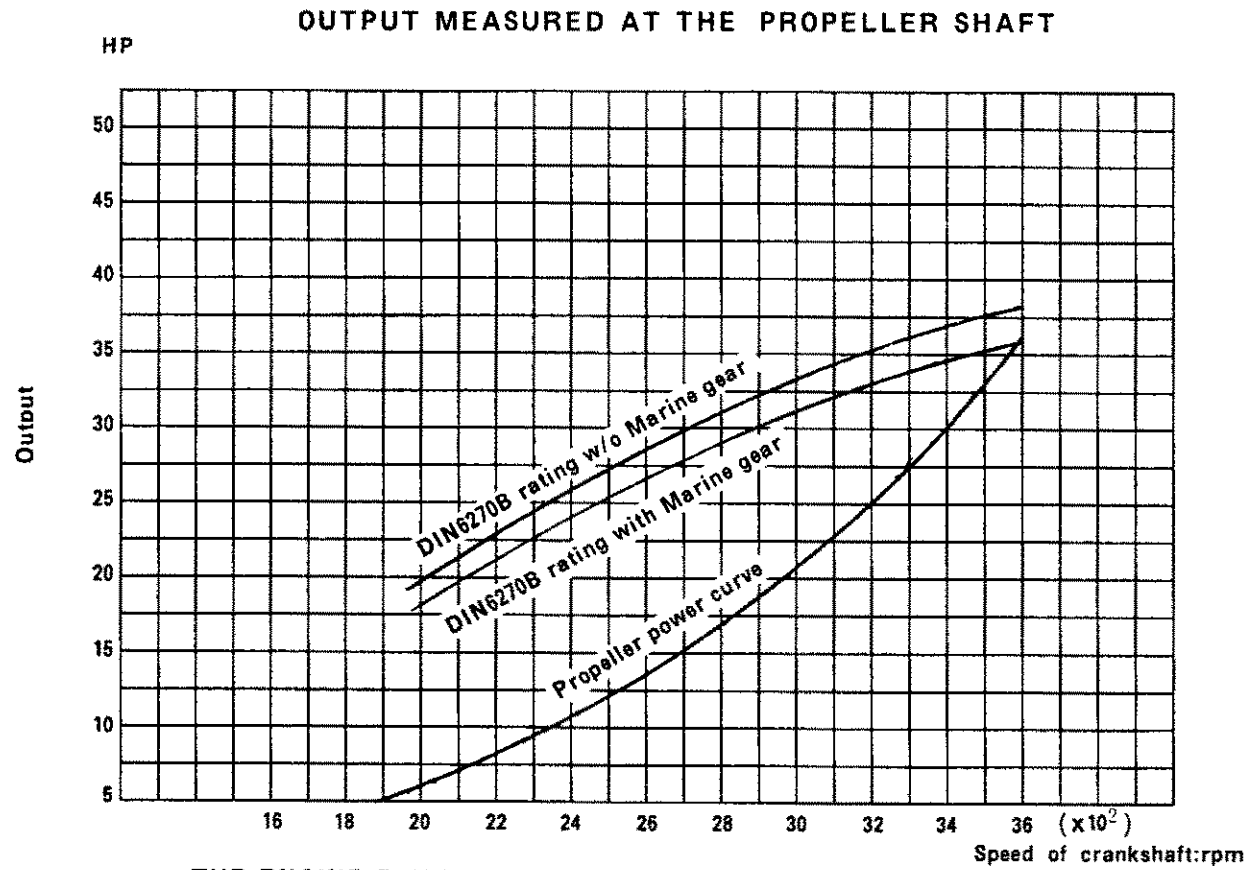
4. Performance Curves

4-1 3JH2-(B)E







THE ENGINE FLYWHEEL OUTPUT IS APPROX 3% HIGHER

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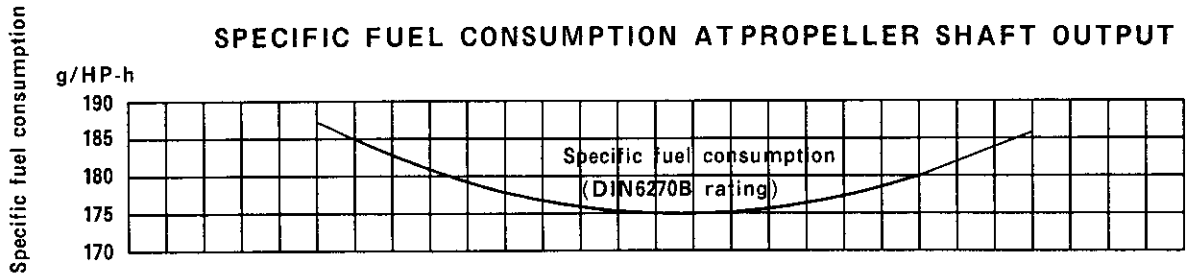
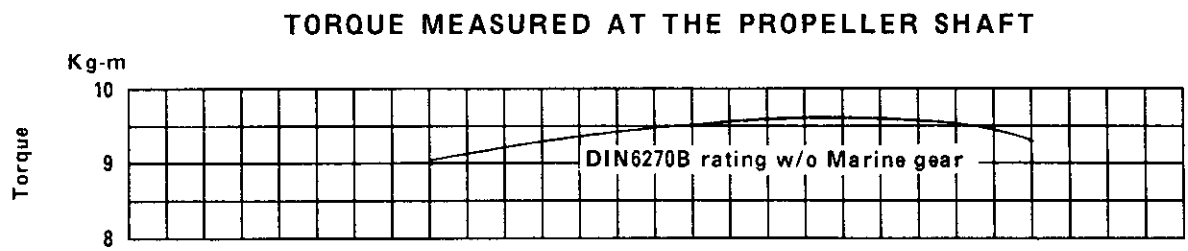
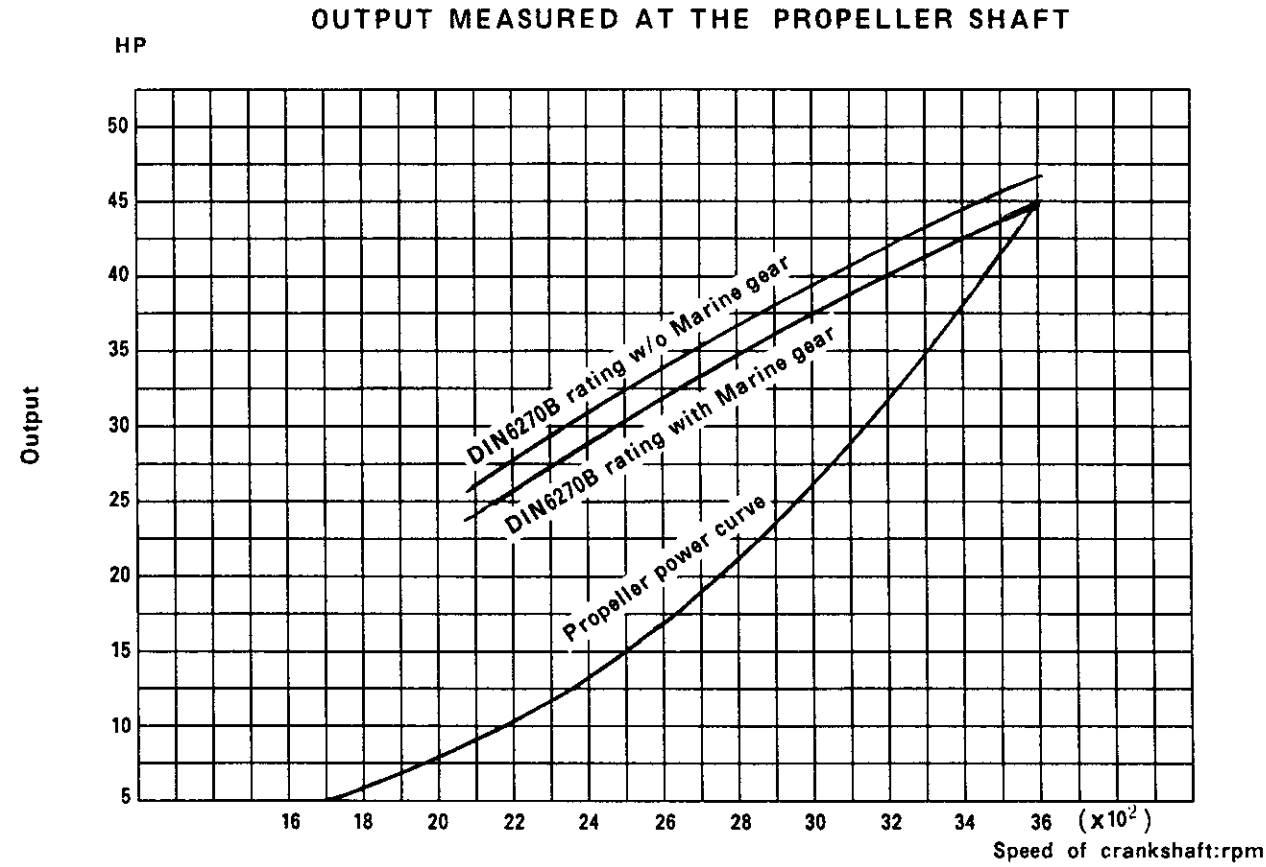
4-2. 3JH2-T(B)E







THE ENGINE FLYWHEEL OUTPUT IS APPROX 3% HIGHER

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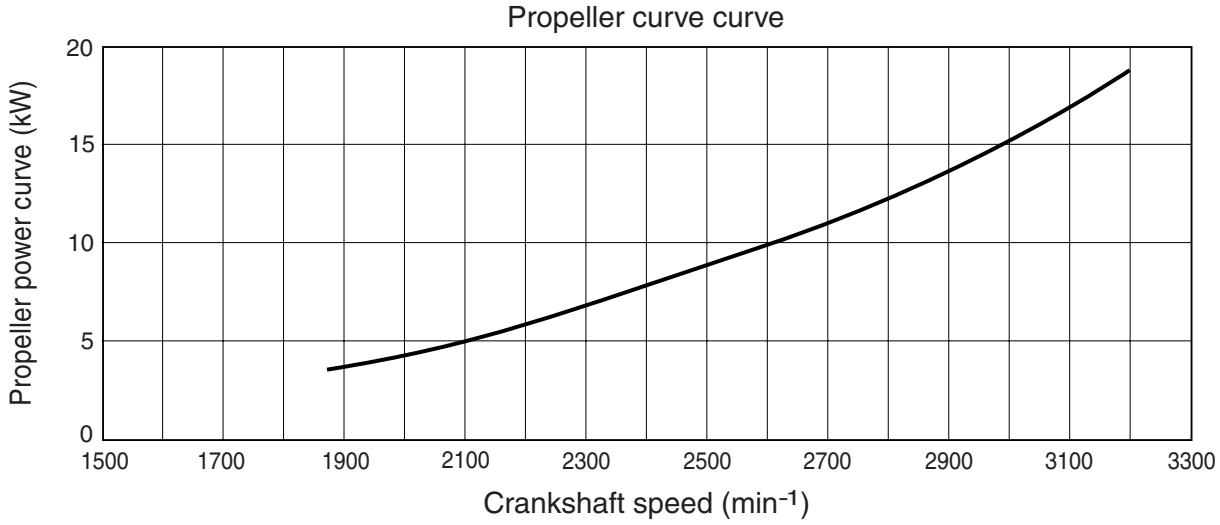
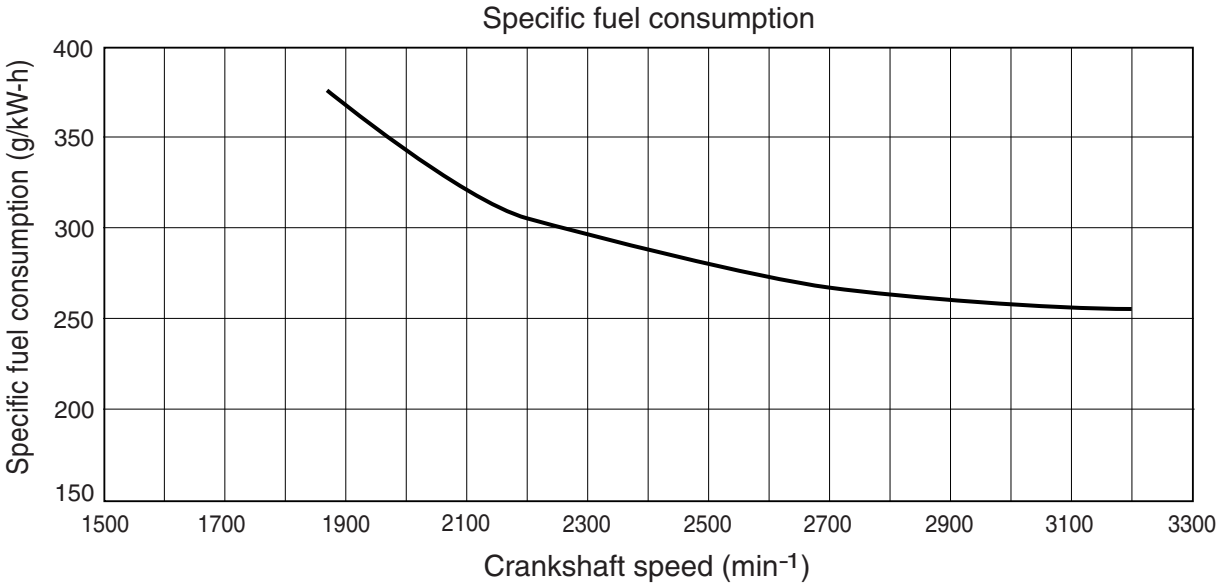
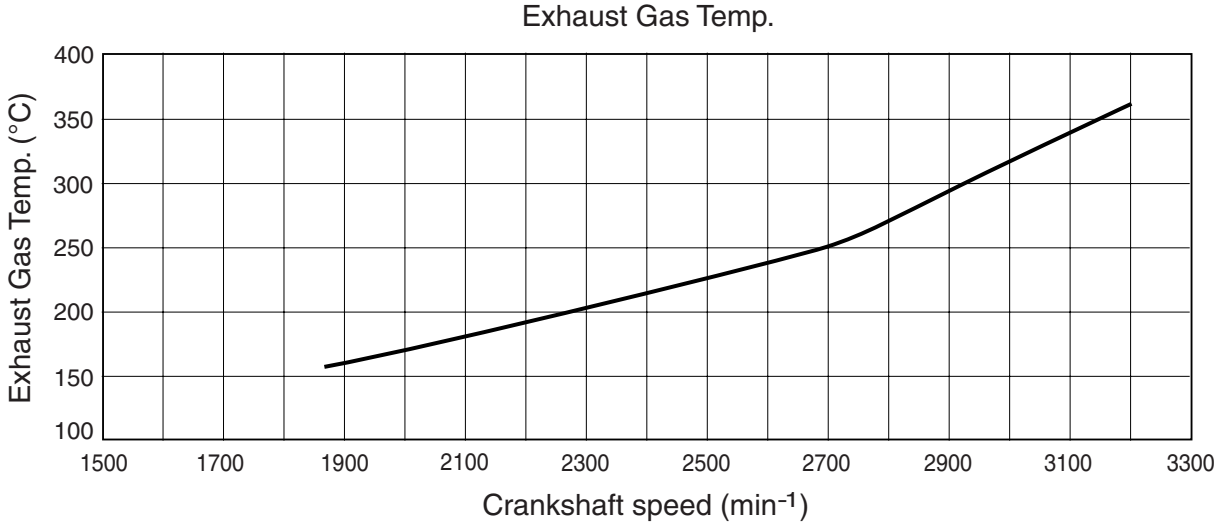
3JH25A Performance Curve







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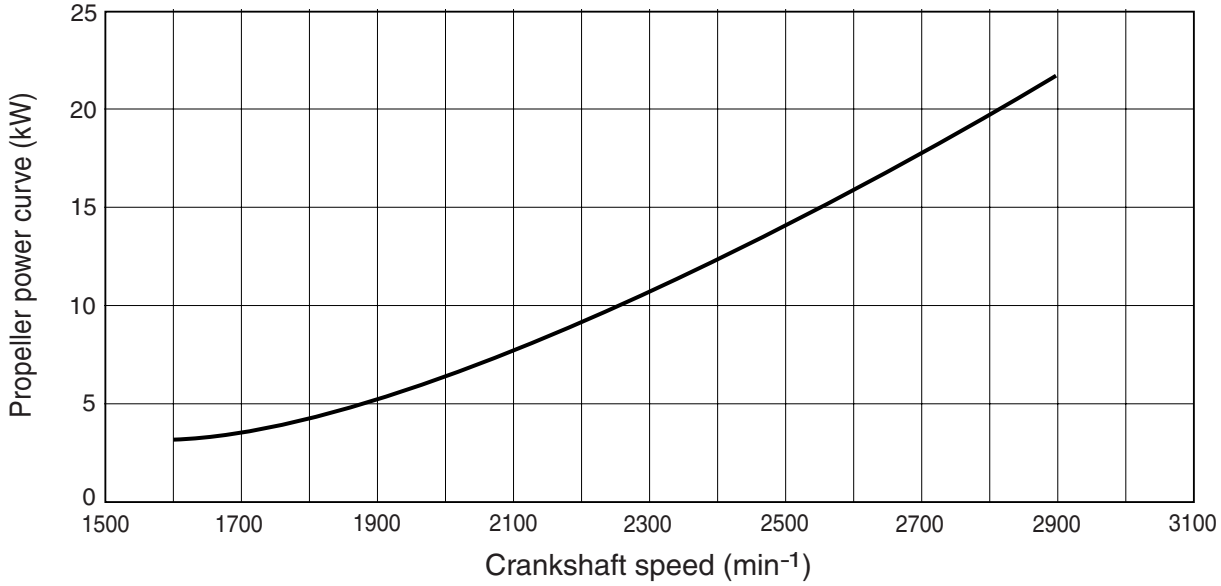
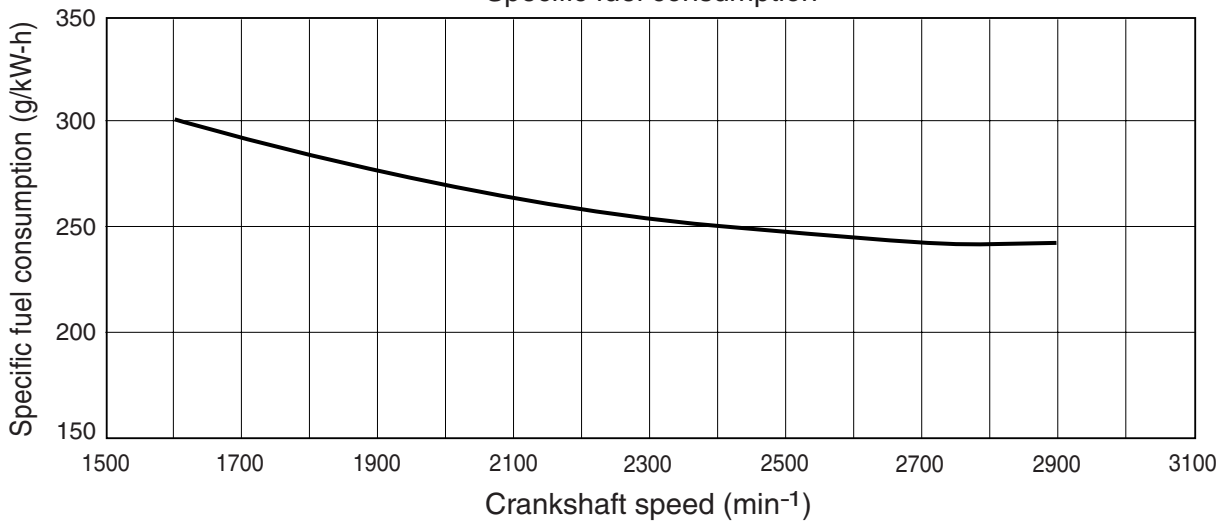
3JH30A Performance Curve

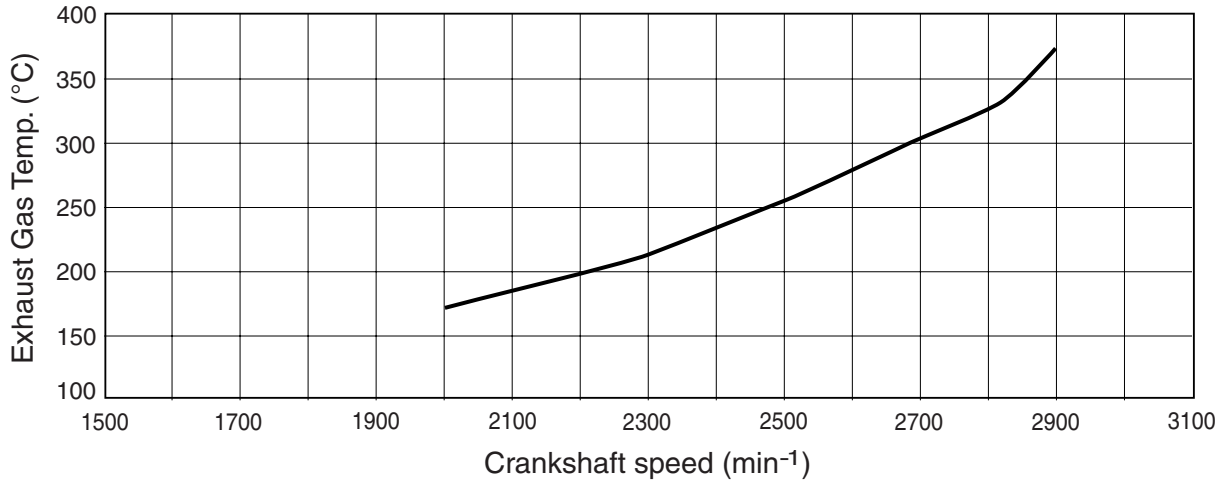
Propeller curve curve



Specific fuel consumption



Exhaust Gas Temp.



CHAPTER 2

BASIC ENGINE PARTS

1. Cylinder Block 2-1
2. Cylinder Head 2-4
3. Piston and Piston Pins 2-11
4. Connecting Rod 2-15
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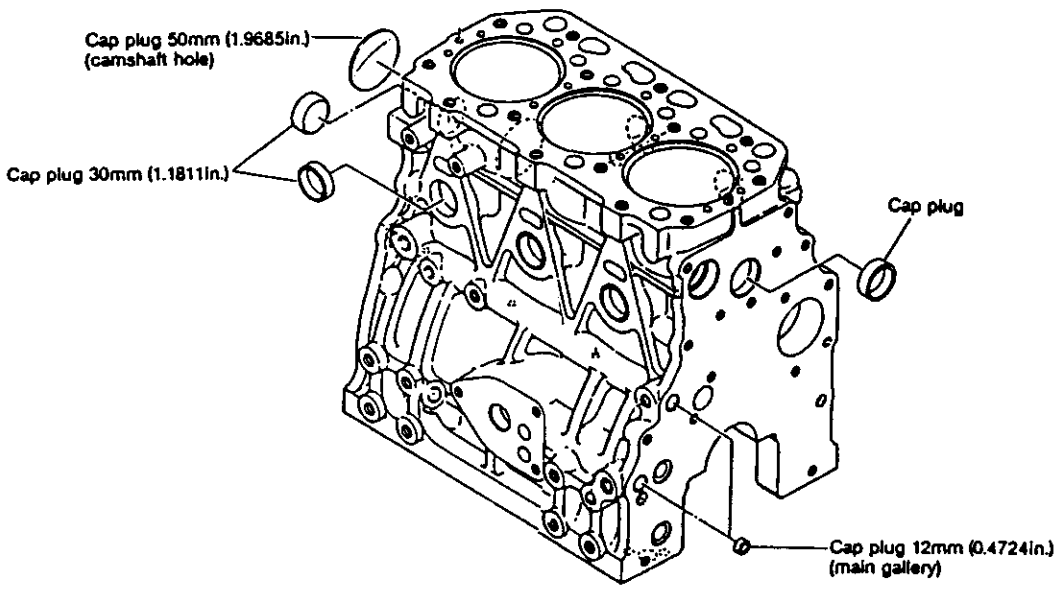
1. Cylinder Block

The cylinder block is a thin-skinned, (low-weight), short skirt type with rationally placed ribs. The side walls are wave shaped to maximize ridigity for strength and low noise.



1-1 Inspection of parts

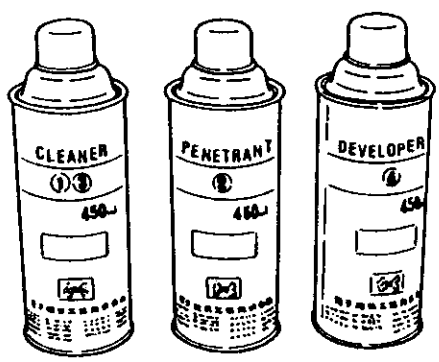
Make a visual inspection to check for cracks on engines that have frozen up, overturned or otherwise been subjected to undue stress. Perform a color check on any portions that appear to be cracked, and replace the cylinder block if the crack is not repairable.

1-2 Cleaning of oil holes

Clean all oil holes, making sure that none are clogged up and the blind plugs do not come off.

Color check kit
Part code No. 97550-004560

	Quantity
Penetrant	1
Developer	2
Cleaner	3



1-3 Color check procedure

(1) Clean the area to be inspected.
(2) Color check kit
The color check test kit consists of an aerosol cleaner, penetrant and developer.
(3) Clean the area to be inspected with the cleaner.
Either spray the cleaner on directly and wipe, or wipe the area with a cloth moistened with cleaner.
(4) Spray on red penetrant
After cleaning, spray on the red penetrant and allow 5 ~ 10 minutes for penetration. Spray on more red penetrant if it dries before it has been able to penetrate.
(5) Spray on developer
Remove any residual penetrant on the surface after the penetrant has penetrated, and spray on the developer. If there are any cracks in the surface, red dots or a red line will appear several minutes after the developer dries.
Hold the developer 300 ~ 400mm (11.8110 ~ 15.7480in.) away from the area being inspected when spraying, making sure to coat the surface uniformly.
(6) Clean the surface with the cleaner.

NOTE: Without fail, read the instructions for the color check kit before use.

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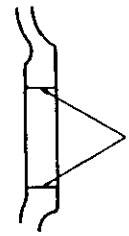
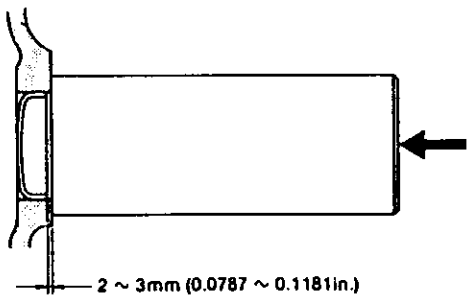
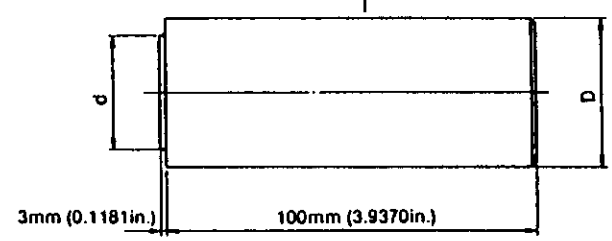
1-4 Replacement of cup plugs

Step No.	Description	Procedure	Tool or material used
1.	Clean and remove grease from the hole into which the cup plug is to be driven. (Remove scale and sealing material previously applied.)	 Remove foreign materials with a screw driver or saw blade.	•Screw driver or saw blade •Thinner
2.	Remove grease from the cup plug.	Visually check the nick around the plug.	•Thinner
3.	Apply Threebond No. 4 to the seat surface where the plug is to be driven in.	Apply over the whole outside of the plug.	•Threebond No. 4
4.	Insert the plug into the hole.	Insert the plug so that it sits correctly.	
5.	Place a driving tool on the cup plug and drive it in using a hammer.  2 ~ 3mm (0.0787 ~ 0.1181in.) *Using the special tool, drive the cup plug so that the edge of the plug is 2mm (0.0787in.) below the cylinder surface.	Drive in the plug parallel to the seating surface. 	•Driving tool •Hammer

mm (in.)

Plug dia.	d	D
ø12	ø11.9 ~ 12.0 (ø0.4685 ~ 0.4724)	ø20 (ø0.7874)
ø30	ø29.9 ~ 30.0 (ø1.1770 ~ 1.8110)	ø40 (ø1.5748)

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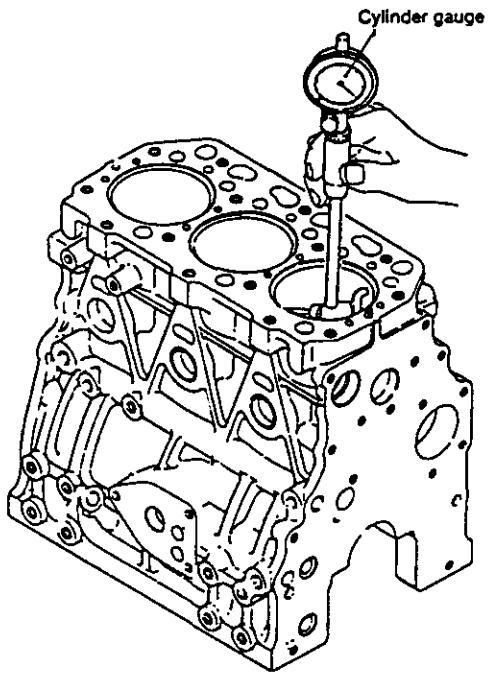
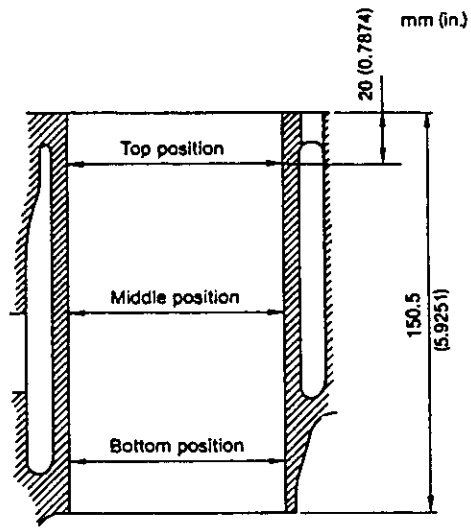
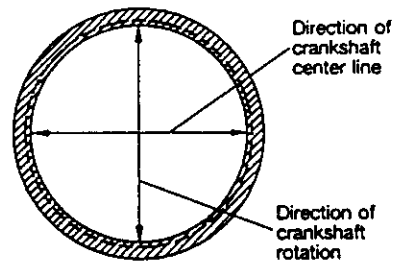
1-5 Cylinder bore measurement

Measure the bore diameter with a cylinder gauge at the positions shown in the figure.
Replace the cylinder bore when the measured value exceeds the wear limit. Measurement must be done at least at 3 positions as shown in the figure, namely, top, middle and bottom positions in both directions along the crankshaft rotation and crankshaft center lines.







mm (in.)

	Standard	Wear limit
Cylinder bore dia.	ø82.00 ~ 82.03 (3.2283 ~ 3.2295)	ø82.06 (3.2307)
Cylinder roundness	0 ~ 0.01 (0 ~ 0.0004)	0.02 (0.0008)

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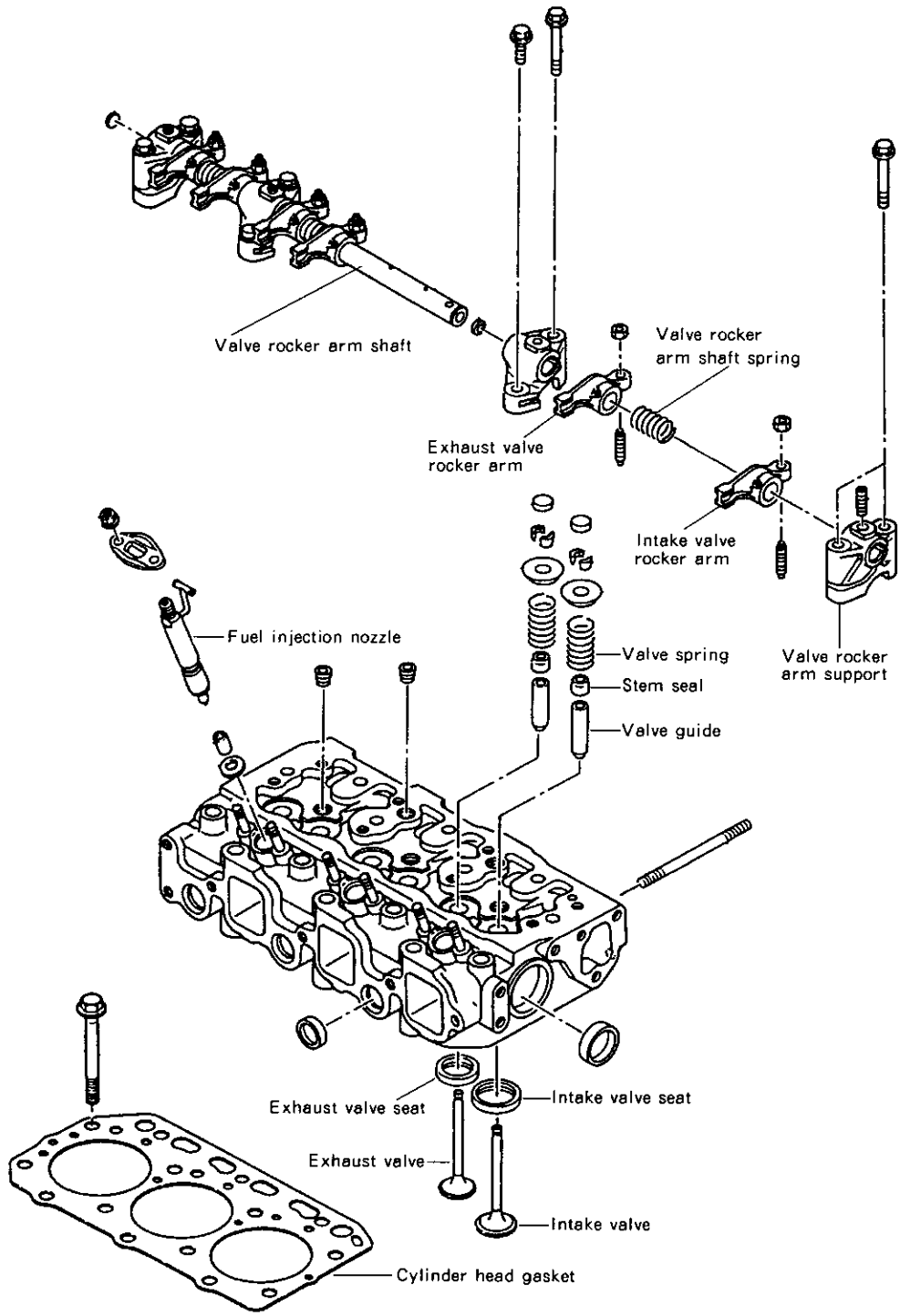
2. Cylinder Head

The cylinder head is of 4-cylinder integral construction, mounted with 18 bolts. Special alloy stellite with superior resistance to heat and wear is fitted on the seats, and the area between the valves is cooled by a water jet.



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