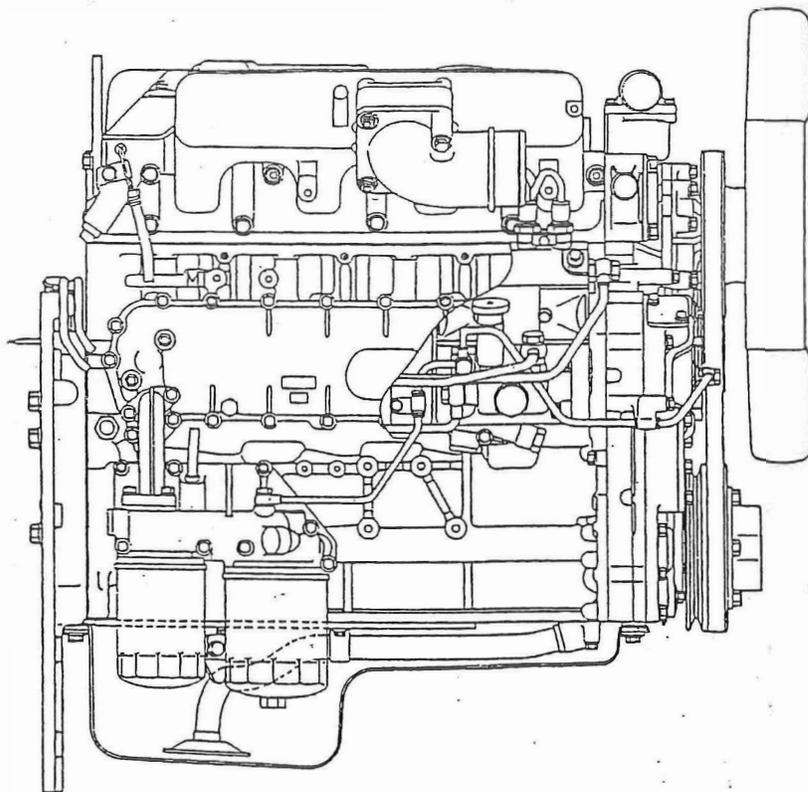


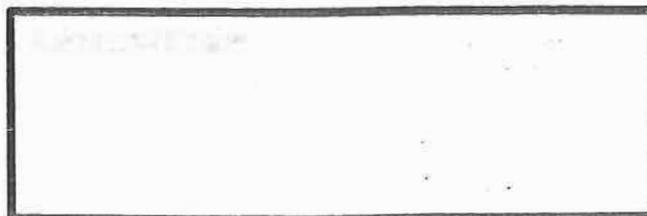
ENGINE MAINTENANCE MANUAL

For

YALE TM DIESEL 4 CYLINDER ENGINE



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DESCRIPTION OF ADVISORY LABELS USED IN THIS PUBLICATION

THE READER MAY FIND ANY OR ALL OF THE FOLLOWING LABELS USED IN THIS PUBLICATION. AN UNDERSTANDING OF THEIR USE, AS GIVEN BELOW WILL AID THE READER.

NOTE

An advisory procedure, practice, condition, etc., which is essential to emphasize.

 **CAUTION**

Directs attention to hazards or unsafe practices which may result in minor personal injury, product or property damage if the proper precautions are not taken.

 **WARNING**

Directs attention to unsafe practices which could result in personal injury or death if proper precautions are not taken.

 **DANGER**

Directs attention to unsafe practices and/or existing hazards which WILL result in severe personal injury or death if proper precautions are not taken.

This Maintenance Manual is divided into major sections which are listed on this page. Quick reference to these sections can be made by placing the right thumb on the tab of the desired section, bending the book back and thumbing the pages to the corresponding tab.

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4	LUBRICATION SYSTEM
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1	INTRODUCTION
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INTRODUCTION

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ENGINE SPECIFICATION TABLE

Manufacturer		Yale		
Engine model		TM		
Total displacement		cc / (cu in)		
		4,553 / (277.8)		
Starting method		Self-starter		
Classification		Four-cycle diesel engine		
Number and arrangement of cylinders		Four vertically aligned cylinders		
Combustion chamber type		Direct injection type		
Direction of rotation (Viewed from rear of engine / flywheel)		Counterclockwise (CCW)		
Valve mechanism		Overhead valve (OHV)		
Cylinder liner type		Dry type		
Bore and stroke		mm / (in)		
		109.0 × 122.0 / (4.29 × 4.80)		
Compression ratio		18:1		
Compression pressure		kg/cm ² @ rpm / (psi @ rpm)		
		30 @ 270 / (426.7 @ 270)		
Maximum output		ps @ rpm / (hp @ rpm)		
		85 @ 2200 / (83.8 @ 2200)		
Maximum torque		kg-m @ rpm / (lb ft @ rpm)		
		29 @ 1600 / (209 @ 1600)		
Fuel consumption rate		g / ps-h @ rpm / (lb / hp-hour @ rpm)		
		163 @ 1250 (.3645 @ 1250)		
Dimensions		mm / (in)		
		Length	Height	Width
		808.9 / (31.85)	745 / (29.33)	696.1 / (27.41)
Weight (Dry)		kg / (lb)		
				340 / (749.6)
Valve or port timing	Intake	Open	18.4° BTDC	
		Close	45° ABDC	
	Exhaust	Open	49.4° BBDC	
		Close	17.3° ATDC	
Valve clearance (cold)	mm / (in)		Intake	0.30 / (0.012)
			Exhaust	0.45 / (0.018)
Low idle speed (rpm in neutral)		850 ± 25		
Lubrication system	Lubrication method		Pressure feed	
	Oil pump type		Gear pump type	
	Oil filter type		Full flow (with filter paper)	
	Lubricant amount (total amount)		litre / (qt)	
		9.3 / (9.83)		
Cooling system	Cooling method		Water-cooled, with V-belt	
	Cooling system total capacity		litre / (qt)	
	(engine only)		17 / (17.97)	
			9.8 / (10.36)	
Water pump type		Centrifugal		
Thermostat type		Wax-type		

Engine model		TM	
		Type	Cyclone filter paper type
		Quantity	1
Fuel line material		Rubber and steel	
Fuel filter type		Full flow (with filter paper)	
Injection Pump	Manufacturer		Zexel corporation
	Type		Bosch A in-line type
	Injection timing		9° BTDC (cam lifted 1 mm)
	Plunger diameter	mm / (in)	φ 9.5 / (.374)
	Cam lifting amount	mm / (in)	9.0 / (.3543)
	Speed regulator		Centrifugal type
	Injection timing regulator		Centrifugal type
Injection Nozzle	Nozzle supporter type		Flange
	Nozzle type		Multiple hole type
		Quantity	4
		Diameter mm / (in)	0.31 / (0.0122)
		Injection pressure kg/cm ² / (psi)	200 / (2844.6)
Voltage		12 volt negative ground	
Ignition Start Heater System	Type		Coil type - Intake manifold mounted
	Current Draw		190 Amps @ 11 volts
Charging system	Type		Alternator
	Output		50 Amps @ 12 volts
	Voltage and current regulators		IC regulator
Starter motor	Type		Electromagnetic push-in type (auxiliary rotating type)
	Output		2.2 kw

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