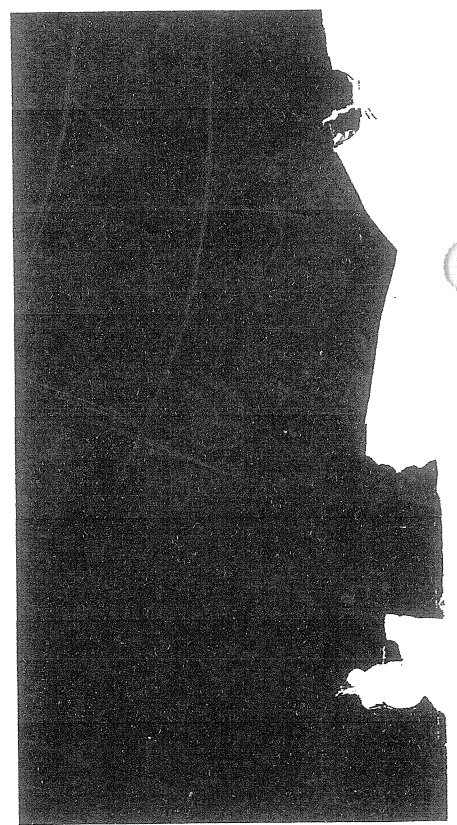


MITSUBISHI  **HEAVY INDUSTRIES, LTD.**

MITSUBISHI
S4E
DIESEL ENGINE
(for BD2F · BS3F)



FOREWORD

This service manual has instructions and procedures for the subject on the front cover. The information, specifications, and illustrations used in this manual are based on information that was current at the time this issue was written.

Correct servicing will give this engine a long productive life. Before attempting to start a test, repair or rebuild job, be sure that you have studied the respective sections of this manual, and know all the components you will work on.

Safety is not only your concern but everybody's concern. Safe working habits cannot be bought or manufactured; they must be learned through the job you do. By learning what CAUTION or WARNING symbol emphasizes, know what is safe — what is not safe. Consult your foreman, if necessary, for specific instructions on a job, and the safety equipment required.

NOTES, CAUTIONS and WARNINGS

NOTES, CAUTIONS and WARNINGS are used in this manual to emphasize important and critical instructions. They are used for the following conditions:




-  An operating procedure, condition, etc., which it is essential to highlight.
-  Operating procedures, practices, etc., which if not strictly observed, will result in damage to or destruction of engine.
-  Operating procedures, practices, etc., which if not correctly followed, will result in personal injury or loss of life.

TABLE OF CONTENTS

Page

SERVICE GUIDE

3 Recommended periodical servicing schedule

CONSTRUCTION AND FUNCTION

7 Description

16 Crankcase

17 Cylinder head

18 Main moving parts

20 Timing gear train

22 Lubrication system

23 Fuel system

36 Cooling system

38 Electrical equipment

MAINTENANCE AND ADJUSTMENT

47 Inspection and adjustment of engine proper

47 Crankcase

51 Cylinder head

61 Timing mechanism

63 Lubrication system

65 Fuel system

78 Cooling system

79 Electrical equipment

84 Bench tests

DISASSEMBLY AND REASSEMBLY

89 Hints for facilitating disassembly-reassembly work

89 Engine dismounting and mounting

89 Rocker arms and rocker shaft

91 Cylinder head

95 Timing gears

97 Lubrication system

100 Cooling system (water pump complete with thermostat)

102 Flywheel and ring gear

104 Fuel filter

104 Injection nozzles

106 Injection pump and governor

120 Engine proper

128 Starter

132 Alternator and regulator unit

MAINTENANCE STANDARDS

137	.....	Maintenance standards
147	.....	Tightening torque
148	.....	Application of sealers
TROUBLESHOOTING		
150	.....	Troubleshooting chart (1)
154	.....	Troubleshooting chart (2)
157	.....	SPECIAL SERVICE TOOLS

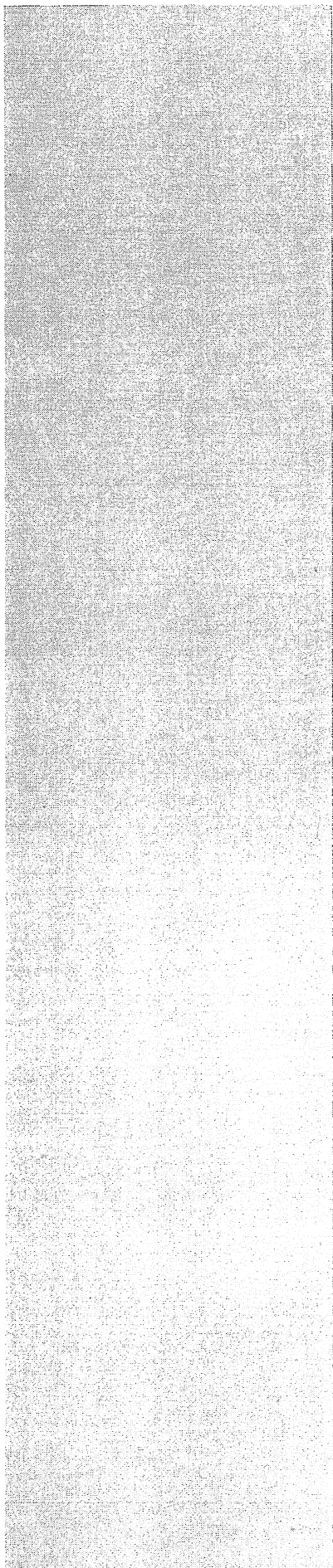
SERVICE GUIDE



RECOMMENDED PERIODICAL SERVICING SCHEDULE

○ refers to engines in regular service.
 ⊙ refers to new engines being broken in.

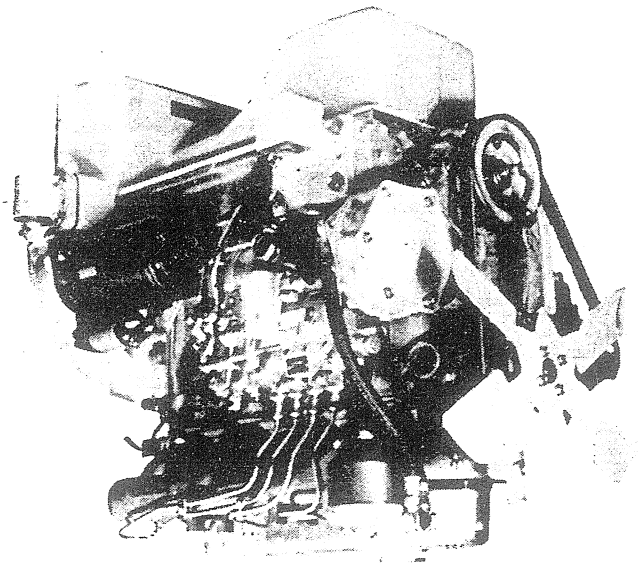
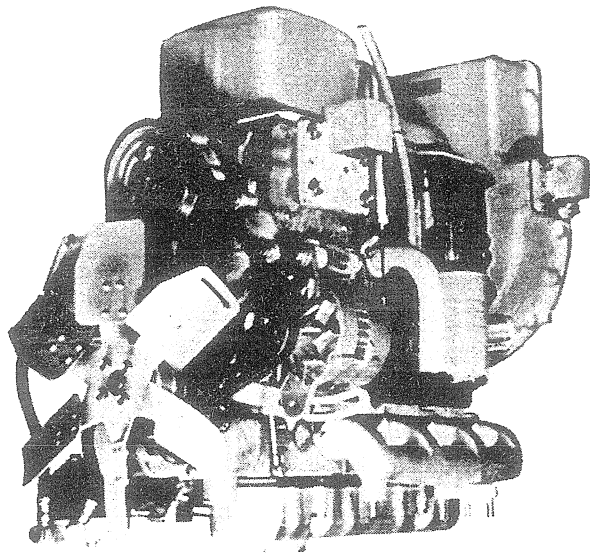
What to service	What to do	Criteria	Servicing intervals (hrs)							Remarks		
			Daily	75	150	300	600	1200				
Lubrication system	Oil pan	Check oil level and replenish.	○									
	Oil pan	Change oil.	⊙									
Lubrication system	Oil filter	Replace filter element.										
	Oil filter	Clean by flushing.										
Fuel system	Fuel filter	Drain out sludge and condensate.										
	Fuel filter	Replace filter element.										
	Feed pump	Clean inlet connection.										
	Injection nozzles	Check injection pressure.	$120 \pm 5 \text{ kg/cm}^2$									
		De-carbon and clean nozzles and seats.	$(1706 \pm 71 \text{ psi})$									
	Fuel tank	Drain out condensate and sludge.	60 liters (16 gallons)									
Fuel tank	Clean by flushing.											
Cooling system	Radiator	Check water level and replenish.	○									
		Change coolant.										
		Clean radiator fins.										
	Fan belt	Check and adjust tension.	12 mm (1/2 in.) of deflection									
	Thermostat	Check for performance.										
Intake system	Air cleaner	Clean element.										
	Air cleaner	Replace element.										
	Boots and nuts on muffler and air cleaner	Check for tightness and retighten.	⊙									
Electrical equipment	Starter	Inspect brushes and commutator for wear; recondition as necessary.										
	Battery	Check acid level and replenish.	○									
		Check electrolyte S.G.										
Engine proper	Valve clearance	Check and adjust.										
	Major bolts	Retighten.										
Engine proper	Glows plugs	Inspect for condition.										
	Packings and seals	Inspect for leakage and repair.	○									



**CONSTRUCTION
AND
FUNCTION**



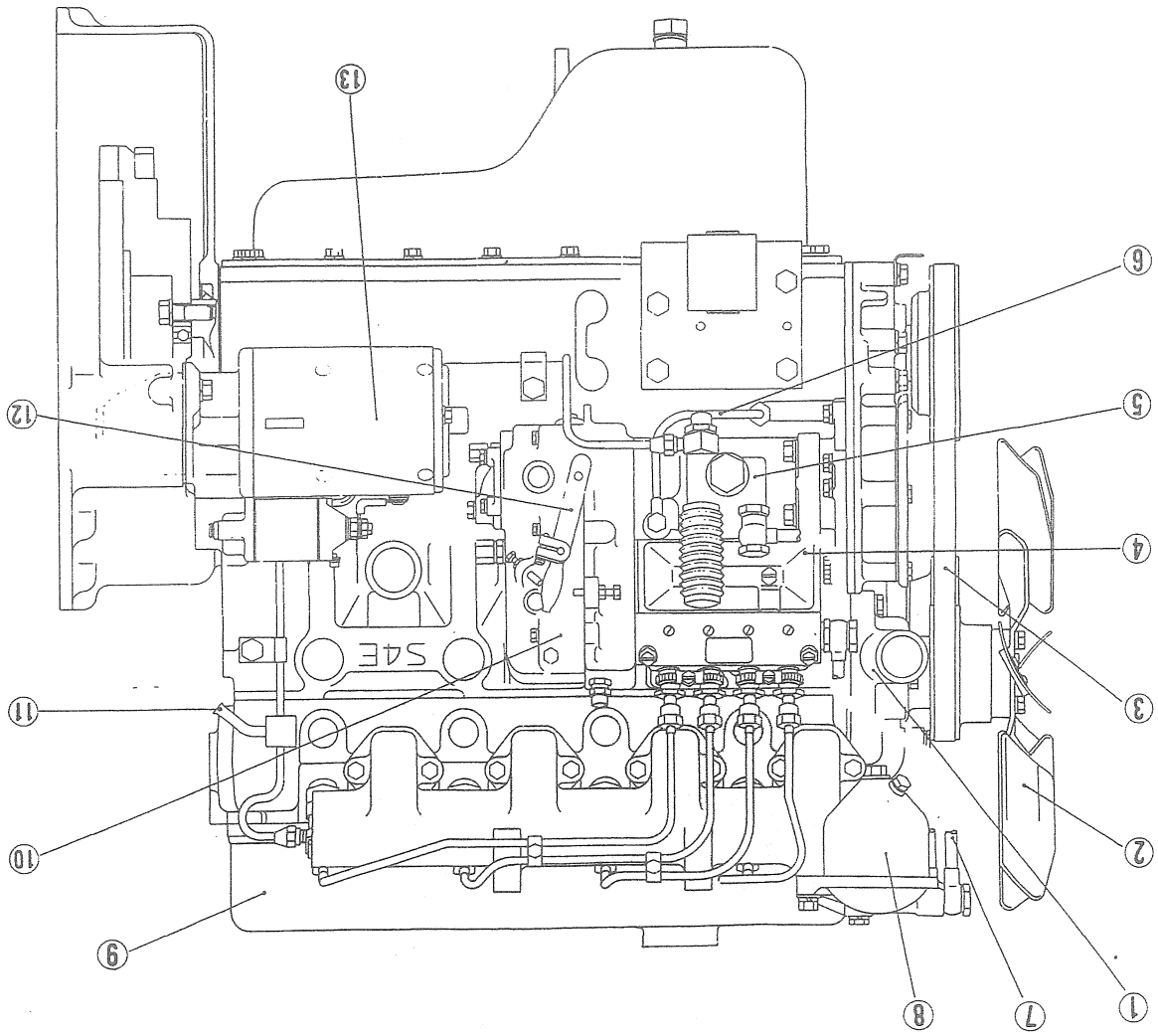




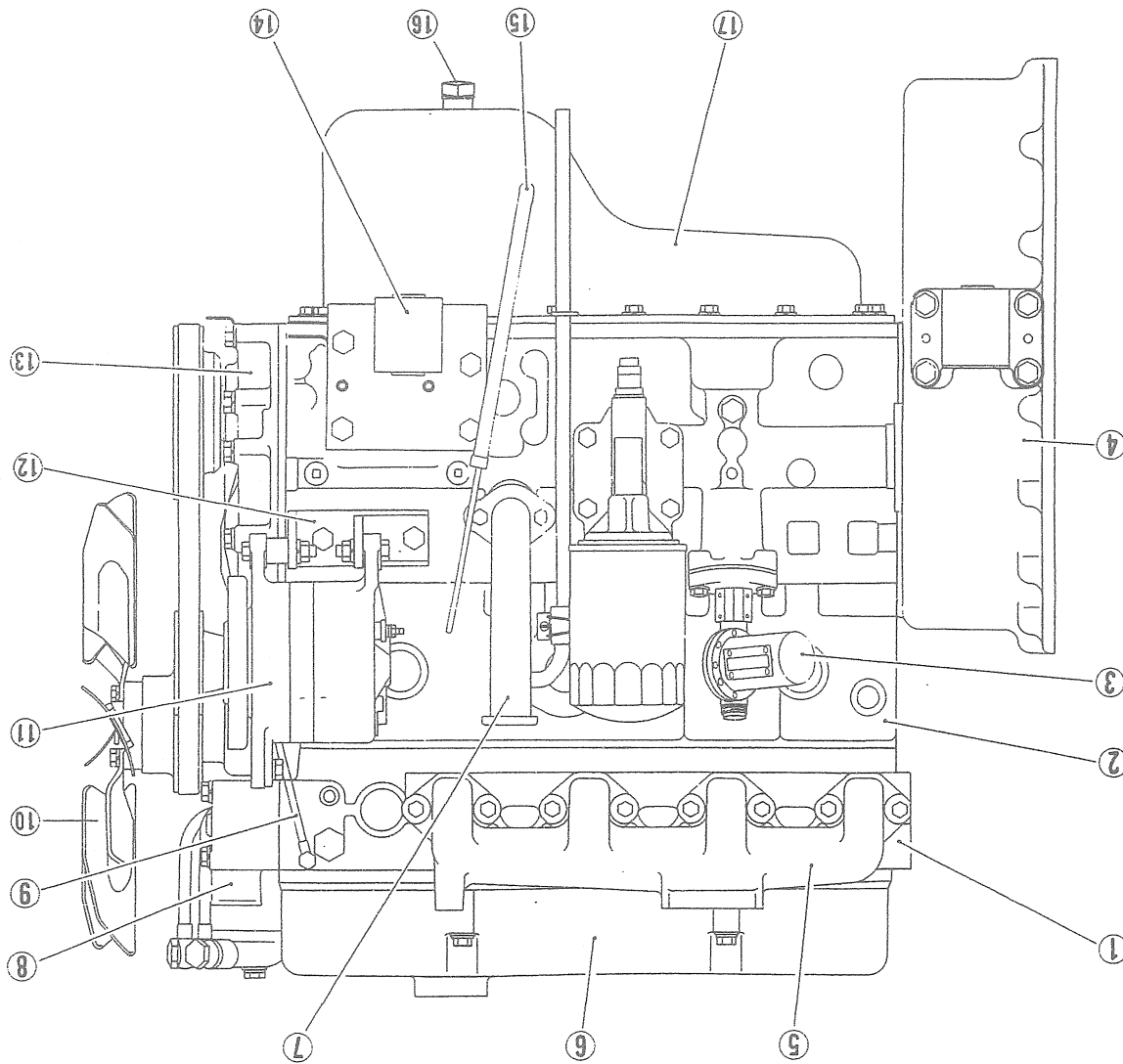
Description
Exterior views

CONSTRUCTION AND FUNCTION

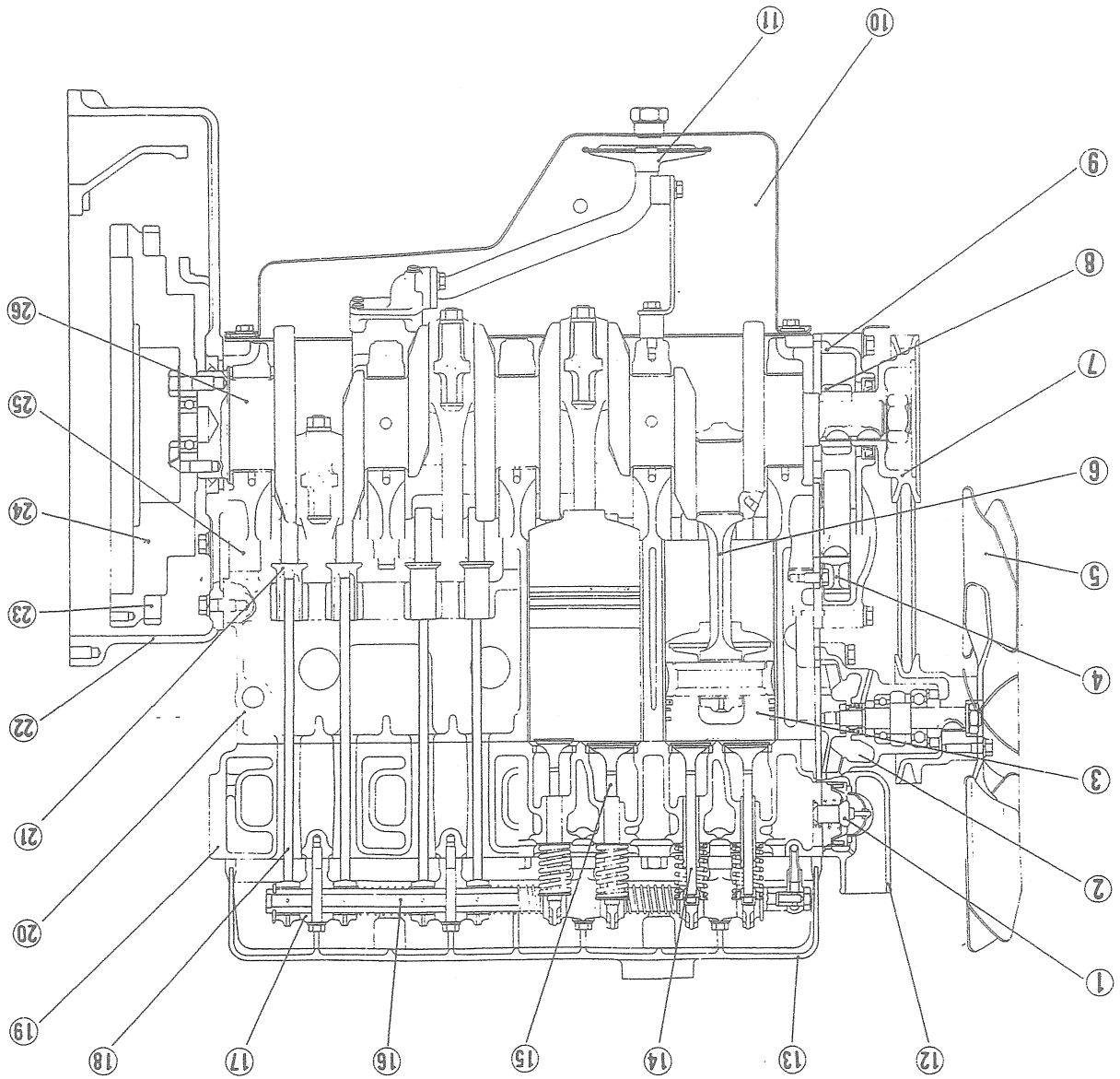
Left-side view



- 1-Water pump
- 2-Fan
- 3-Fan belt
- 4-Fuel injection pump
- 5-Fuel feed pump
- 6-Oil pipe
- 7-Fuel feed pipe
- 8-Fuel filter
- 9-Rocker cover
- 10-Governor
- 11-Fuel inlet
- 12-Adjusting lever
- 13-Starter

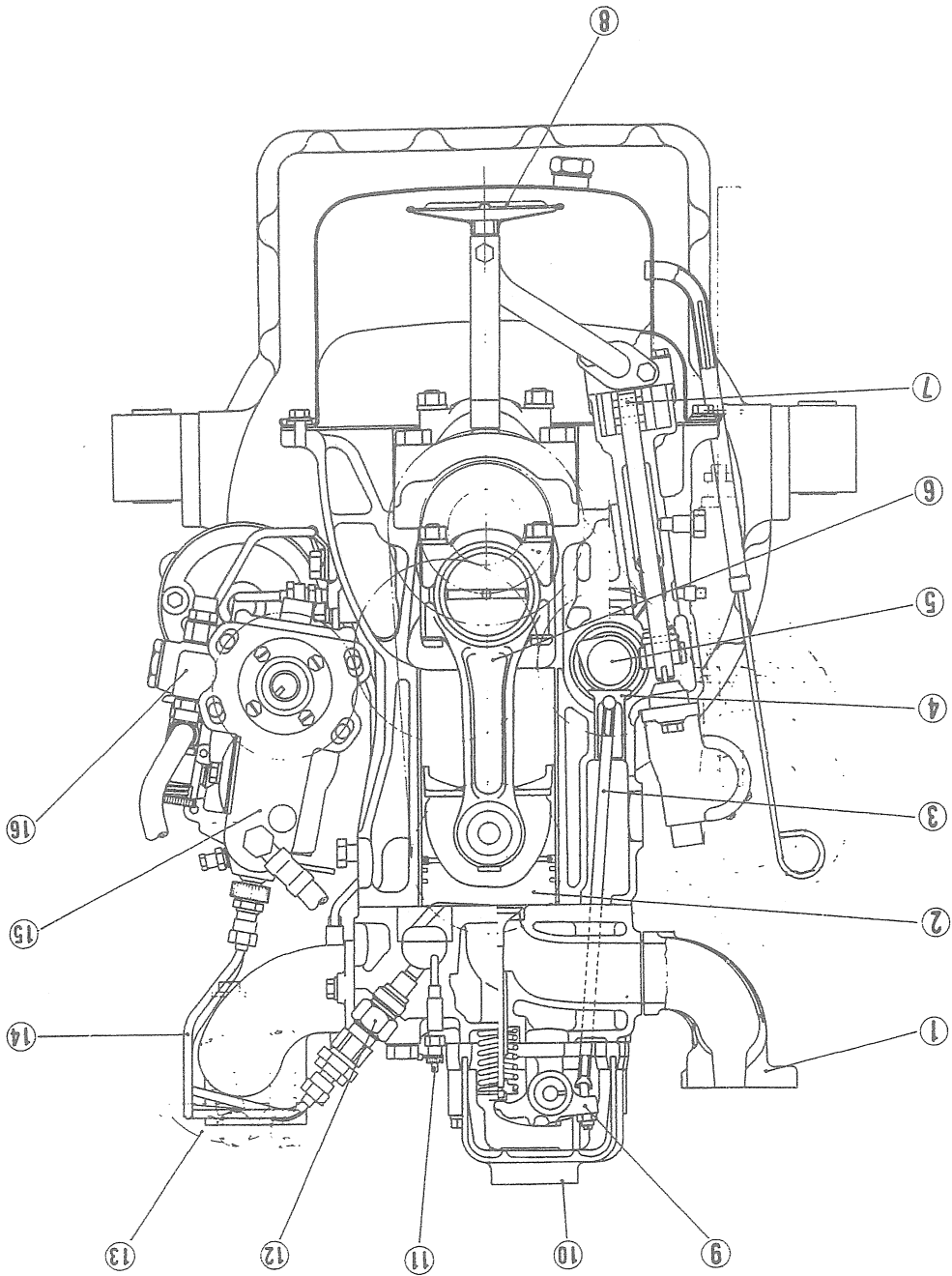


- 1-Cylinder head
- 2-Crankcase
- 3-Service meter
- 4-Flywheel housing
- 5-Exhaust manifold
- 6-Rocker cover
- 7-Oil filler
- 8-Thermostat
- 9-Oil pipe
- 10-Fan
- 11-Alternator
- 12-Alternator bracket
- 13-Timing gear case
- 14-Mounting bracket
- 15-Oil level gauge
- 16-Drain plug
- 17-Oil pan



- 1-Thermostat
- 2-Water pump
- 3-Piston
- 4-Camshaft gear
- 5-Fan
- 6-Connecting rod
- 7-Crankshaft pulley
- 8-Crankshaft gear
- 9-Timing gear case
- 10-Oil pan
- 11-Oil strainer
- 12-Elbow
- 13-Rocker cover
- 14-Exhaust valve
- 15-Intake valve
- 16-Rocker shaft
- 17-Rocker bracket
- 18-Valve push rod
- 19-Cylinder head
- 20-Crankcase
- 21-Tappet
- 22-Flywheel housing
- 23-Flywheel ring gear
- 24-Flywheel
- 25-Camshaft
- 26-Crankshaft

Transverse cross section



- 1-Exhaust manifold
- 2-Piston
- 3-Valve push rod
- 4-Tappet
- 5-Camshaft
- 6-Connecting rod
- 7-Oil pump
- 8-Oil strainer
- 9-Rocker arm
- 10-Oil filler
- 11-Glow plug
- 12-Oil injection nozzle
- 13-Fuel filter
- 14-Fuel injection pipe
- 15-Fuel injection pump
- 16-Fuel feed pump