

ISUZU

Bellett

LUBRICATING SYSTEM

ENGINE SERIES

PART 6

INTRODUCTION

ISUZU MOTORS LIMITED

TOKYO, JAPAN

PART 6 LUBRICATING SYSTEM

6-1 INTRODUCTION

A forced oil system is employed in the engine. The oil pressure is controlled by a relief valve set at 10.16 MPa (1470 p.s.i.). The oil pump and its accessories feed the oil to the engine. The oil filter is located between the oil pump and the engine. The oil filter is a paper filter of the pleated type. The oil filter is located between the oil pump and the engine. The oil filter is a paper filter of the pleated type. The oil filter is located between the oil pump and the engine. The oil filter is a paper filter of the pleated type.

PART 6 LUBRICATING SYSTEM

CONTENTS

6-1	Introduction	6-1
6-2	Specifications of the Lubricating System	6-1
6-3	Trouble-shooting	6-2
6-4	Oil Pump	6-3
6-5	Oil Filter	6-7

6-2 SPECIFICATIONS OF THE LUBRICATING SYSTEM

Lubricating system	Forced oil system	Same as left
Type of oil pump	Turbocharger type	Same as left
Oil pump feed ltr/min.	Above 8.25	Above 10.16
Oil pressure (p.s.i.)	Above 8.25	Above 10.16
Oil temperature 90°C	Paper filter	Same as left
Oil filter	Pleated type	Same as left

PART 6 LUBRICATING SYSTEM

6-1 INTRODUCTION

A forced oil circulating system is employed in the Bellett engines. The oil pump serves to feed the lubricating oil to the oil port on the cylinder block through the oil filter element thereby lubricating the entire moving parts of the engine. If the oil filter element is clogged or its filtration is decreased, or the oil pressure is excessively increased to produce a difference of oil pressure between the portions separated by the oil filter, the high pressure oil supplied by the oil pump causes the overflow valve to open on the oil filter and flows directly to the oil port in the cylinder block without going through the oil filter.

In such manner, the lubricating system is so arranged that the

oil pressure is automatically controlled by a relief valve on the oil pump and by the overflow valve in the oil filter. The relief valve on the oil feed pump automatically operates as the oil pressure increases in excess of the specified value and feeds the oil partially back into the oil pan bypassing the lubricating system of the engine thereby regulating the oil pressure. A trochoid type of oil pump is employed for the Bellett engines. The lubricating oil is fed to the valve rocker through the camshaft bearing, oil feed pipe, oil port in the rear part of the cylinder block, oil port in the rocker shaft bracket to the rocker shaft and further fed to the valve rockers.

6-2 SPECIFICATIONS OF THE LUBRICATING SYSTEM

	Model G150	Model G130	Model C180
Lubricating system	Forced circulating system	Same as left	Same as left
Type of oil pump	Trochoid type	"	"
Maximum feed ltr/min. (at 1,400 r.p.m. 4kg/cm ²) (at oil temperature 50°C)	Above 8.25	"	Above 10.16
Type of oil filter	Paper filter element type	"	Same as left

LUBRICATING SYSTEM

Relief valve opening pressure kg/cm ²	3.2 - 3.5	"	"
Overflow valve opening pressure kg/cm ²	0.8 - 1.2	"	"

6-3 TROUBLE-SHOOTING

Cause	Correction
1. Excessive oil consumption	
(1) Use of unsuitable engine oil	Replace with specified oil
(2) Oil leakage	Repaired
(3) Excessively low pressure	Rectify piston ring, piston and cylinder bore or replace the part
(4) Over-heating	Refer Cooling system 3) "Over-heating"
(5) Worn valve guide	Replace valve guide
(6) Wear in the piston ring groove	Replace piston or piston ring
(7) Worn cylinder wall.	Rectify the cylinder bore by inserting liner
(8) Piston ring sticking	Replace piston ring
(9) Excessive use of engine braking effect	Use correct manner of operation
2. Reduced oil pressure	
(1) Use of unsuitable engine oil	Replace with specified engine oil
(2) Relief valve sticking	Replace the parts
(3) Clogged oil pump strainer	Clean the strainer
(4) Excessive play caused by the worn oil pump parts	Replace the parts as necessary
(5) Crack, break or leak in the oil pump feed pipe connection	Rectify or replace the parts as necessary
(6) Oil pump failure	Rectify or replace the parts as necessary

LUBRICATING SYSTEM

(7) Pressure gage failure	Rectify or replace
(8) Crankshaft or connecting rod bearing wear	Fit under-sized bearing
3. Contaminated engine oil	
(1) Clogged oil filter	Replace filter element
(2) Fuel mixture leakage	Rectify piston, cylinder bore or replace the parts as necessary
(3) Failure of the breather system	Rectify or replace the parts
(4) Use of unsuitable engine oil	Replace with the specified engine oil
(5) Unsuitable oil-changing period (intervals)	Replace the engine oil at intervals as specified
4. Engine oil fails to reach the valve system	
(1) Clogged rocker feed pipe	Clean or rectify as necessary
(2) Clogged rocker shaft	Same as above
(3) Clogged rocker bracket port	"
(4) Clogged rocker arm oil port	"
(5) Clogged camshaft oil communicating port	Rectify as necessary

6-4 OIL PUMP

6-4-1 Specifications

	Model G150	Model G130	Model C180
Type	Trochoid type	Same as left	Same as left
Amount of oil delivery (pump revolution 1,400r.p.m. 4kg/cm ² at 50°C)	Above 8.25	"	Above 10.16
Tip clearance between rotor and vane (mm)	0 - 0.14	"	0.005 - 0.14

Clearance between the vane rotor and cover	0.014 - 0.056	"	0.02 - 0.07
Clearance between vane and pump body	0.20 - 0.27	"	Same as left
Clearance between pump shaft and pump body	0.04	"	0.014 - 0.057

6-4-2 Component parts of the oil pump

Component parts of the oil pump

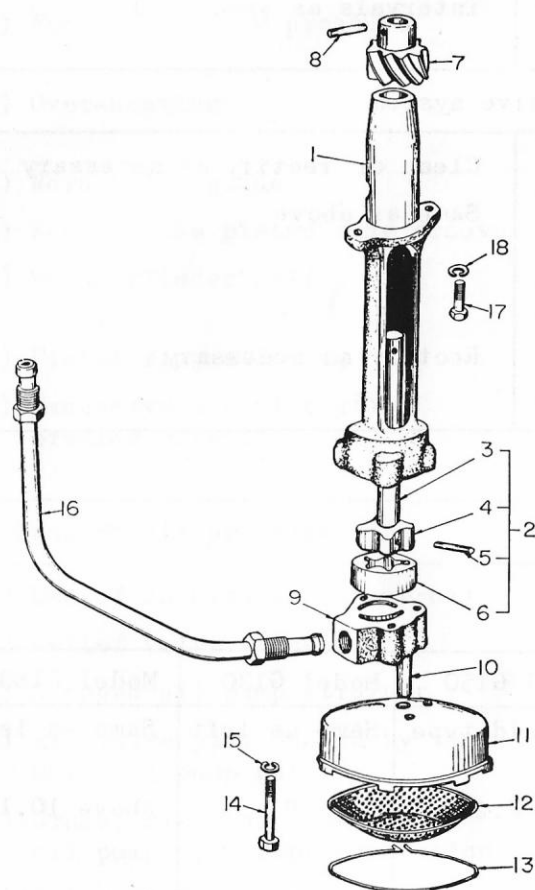


Fig. 6-1

- (1) Body
- (2) Gear assembly
- (3) Shaft
- (4) Rotor
- (5) Pin
- (6) Vane
- (7) Oil pump pinion
- (8) Pin
- (9) Cover
- (10) Pipe
- (11) Oil strainer case
- (12) Gauze
- (13) Snap ring
- (14) Bolt
- (15) Spring washer
- (16) Oil pipe assembly
- (17) Bolt
- (18) Spring washer

6-4-3 Removing

- 1) Remove the oil pan
- 2) Remove the oil pan assembly
- 3) Remove the oil pump clamping bolt and take out the oil pump assembly.

6-4-4 Dismantling

- 1) First remove the snap ring and strainer case fixing bolts and then dismantle the strainer case, oil pump cover and vane.
- 2) Disconnect the pipe assembly from the pump cover.
- 3) The rotor and the pinion are mounted on the rotor shaft with a knock pin so that they cannot be dismantled.

6-4-5 Inspecting and repairing

All the pertinent parts should be cleaned before they are inspected and repaired as necessary.

Measuring tip clearance

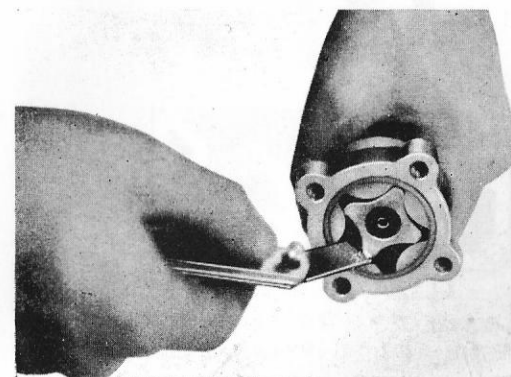


Fig. 6-2

- 1) Inspecting the clearance between the rotor shaft and the pump body. The rotor shaft is not removable from the pump body so that the clearance between the rotor shaft and the pump body should be checked with the shaft put through the pump body. If the clearance is more than 0.2mm, the assembly should be replaced.
- 2) If there is considerable wear in the teeth of the rotor and the vane, the assembly should be replaced.

Measuring the clearance between vanelotor and cover



Fig. 6-3

- 3) If the clearance between the vane, the rotor and the cover is in excess of 0.15mm, either the cover or the assembly should be replaced.
- 4) If the clearance between the vane and the pump body is in excess of the specified value, the assembly should be replaced.

Measuring the clearance
between vane and pump body

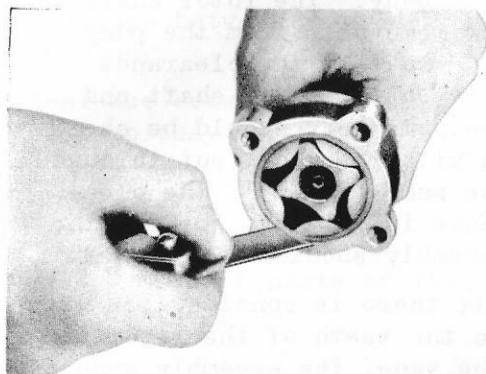


Fig. 6-4

- 5) If the vane, rotor or gear is worn or damaged, the assembly should be replaced.

6-4-6 Reassembling

- (1) Reverse the procedure for dismantling

6-5 OIL FILTER

6-5-1 Specifications

	Model G150	Model G130	Model C180
Type	Paper filter element	Same as left	Same as left
Relief valve opening pressure kg/cm ²	3.2 - 3.5	"	"
Over-flow valve opening pressure kg/cm ²	0.8 - 1.2	"	"

6-5-2 Construction and the component parts of the filter

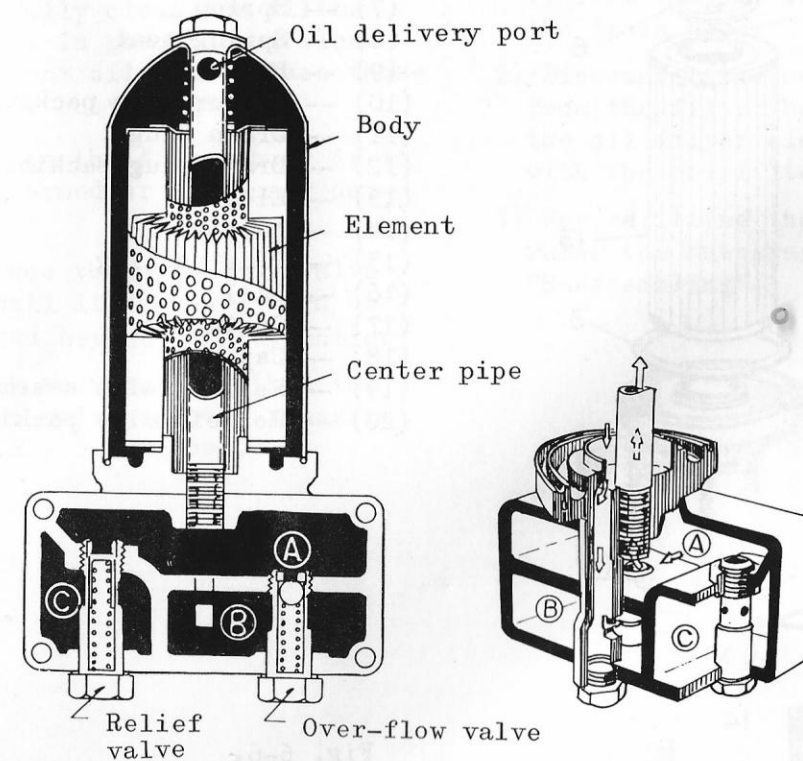
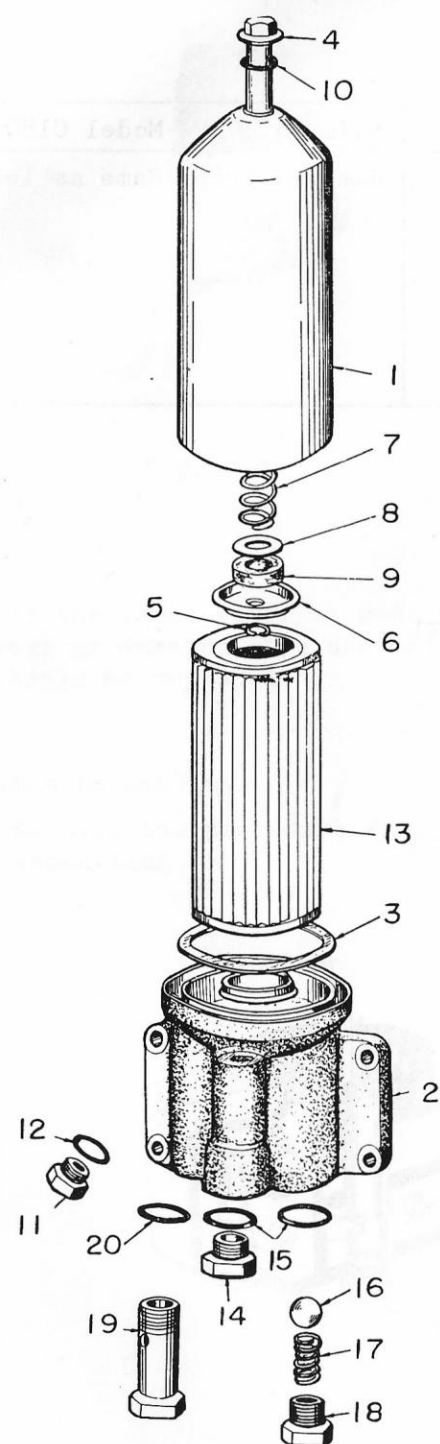


Fig. 6-5

Component parts of the oil filter



- (1) -- Body
- (2) -- Cover
- (3) -- Element packing
- (4) -- Center pipe
- (5) -- Snap ring
- (6) -- Element holder
- (7) -- Spring
- (8) -- Spring seat
- (9) -- Felt ring
- (10) -- Center pipe packing
- (11) -- Drain plug
- (12) -- Drain plug packing
- (13) -- Element
- (14) -- Adapter
- (15) -- Plug packing
- (16) -- Ball
- (17) -- Spring
- (18) -- Cap
- (19) -- Relief valve assembly
- (20) -- Relief valve packing

Fig. 6-6

6-5-3 Dismantling

The four clamping bolts should be removed before dismantling the oil filter assembly.

- 1) Remove the relief valve assembly (19)
- 2) Remove the cap (18) from the over-flow valve and then dismantle the spring (17) and ball (19)
- 3) Remove the center pipe (4) and then, take out the filter element. (See Fig. 6-6)

6-5-4 Cleaning and inspecting

- 1) Carefully clean the filter element in gasoline or clean detergent oil and replace those torn or contaminated.
- 2) Replace the filter body if it is deformed or seriously damaged.
- 3) Replace the over-flow valve and ball if they are worn or damaged beyond the correction
- 4) Check to make sure that the relief valve opening pressure is 3.2 - 3.5 kg/cm².

6-5-5 Reassembling

Reverse the procedures for dismantling but the following should be carefully noted.

- 1) All the packings and gaskets should be replaced with new ones.
- 2) Center pipe of the filter body should be clamped by applying the torque of up to 3.0 m-kp.

6-5-6 Procedures for replacing the oil filter element

- 1) Drain the engine oil entirely from the oil filter through the drain plug.
- 2) Disconnect the center pipe from the filter body and remove the oil filter element together with the oil filter body.
- 3) For refitting the filter, refer the subparagraph 6-5-5 "Reassembling".