

# **ZS1100 DIESEL ENGINE OPERATION MANUAL**

SERVICE INSTRUCTIONS

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**MADE IN CHINA**



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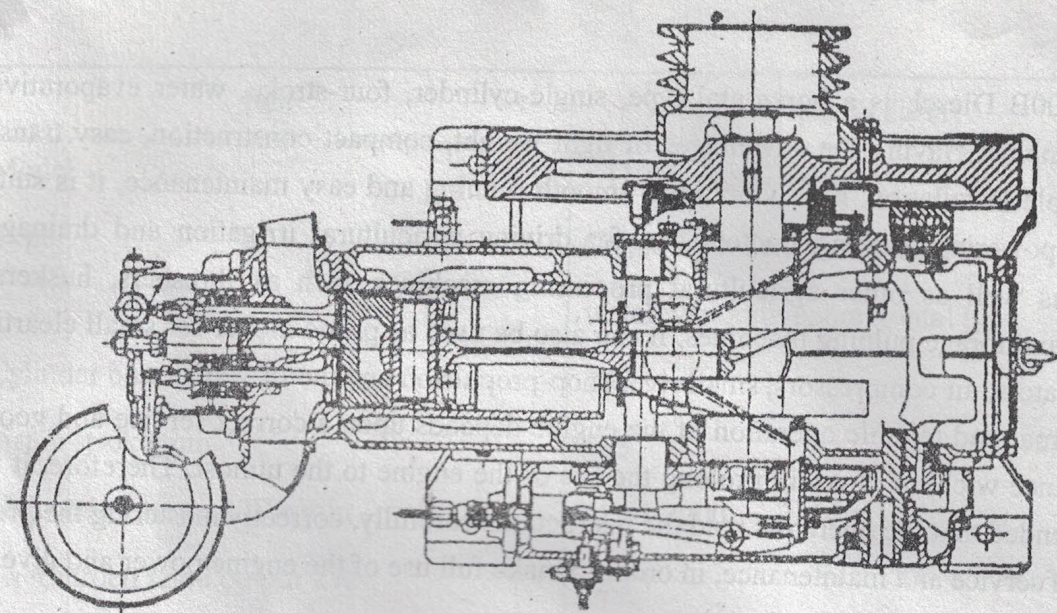
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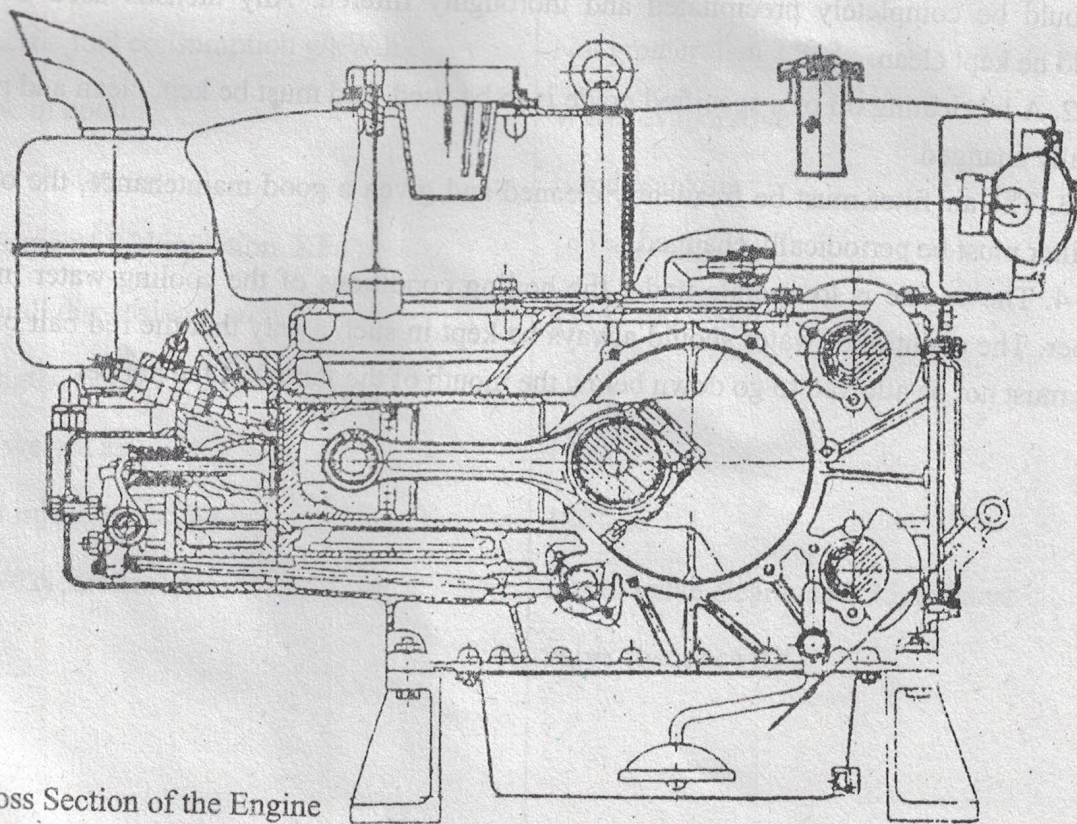
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Longitudinal Section of the Engine



Cross Section of the Engine



## Section I . General Description

S1100B Diesel, is a horizontal type, single-cylinder, four-stroke, water evaporative cooling engine. Having the advantages of light weight, compact construction, easy transport, simple installation, little vibrations, smooth running and easy maintenance, it is suitable for powering walking tractors and for driving agricultural irrigation and drainage pumps, as well as other agricultural processing machines such as threshers, huskers, grinders and forage pulping machines. It can also be used as prime mover for small electrical generators, air compressors, small river shop-propulsion and motor vehicles.

Normal and reliable operation of the engine depends upon a correct service and good maintenance which, in turn will prolong the life of the engine to the utmost. Therefore, it is recommended that the operators read the instructions carefully, correctly mastering the procedure of service and maintenance, in order to make full use of the engine power and give a good service.

In short, it is recommended that the operators, when operating the engine, pay close attention to the following:

1. A fuel of a specified grade is to be used, and before being poured into the fuel tank, it should be completely precipitated and thoroughly filtered. Any utensils used herein should be kept clean.

2. A lubricating oil of a specified grade is to be used, and must be kept clean and periodically changed.

3. The air filter must be frequently cleaned and given a good maintenance, the oil in the filter must be periodically changed.

4. The engine is to operate under the boiling conditions of the cooling water in the hopper. The quantity of water should always be kept in such a way that the red ball of the float must not be allowed to go down below the mouth of the funnel of the hopper.

Model

Type

Cylinder

Piston s

12-hr.ra

Overbu

Piston c

Compre

B.M.E.I

Specific

Type of

Type of

Pressure

Overall

(Length

Net wei

Fuel inj

Valve cl



## Section II. Principal Technical Specifications

Item	Specifications
Model	S1100B diesel engine
Type	Single-cylinder, four-stroke, waterevaporative, horizontal type
Cylinder bore mm	100
Piston stroke mm	115
12-hr.rated output kW/r/min	11.03/2200
Overburden rated outpur kW	12.13
Piston displacement liter	0.903
Compression ratio	20
B.M.E.P. kPa	697
Specific fuel consumption g/kW.h	Not greater than 250.2
Type of cooling	Water evaporative
Type of starting	Hand cranking
Pressure of fuel injection KPa	12750± 490
Overall dimensions mm (Length × width × height)	854 × 490 × 669
Net weight kg	150
Fuel injection timing	180° ± 1°
Valve clearance mm	Intake valve clearance 0.35, exhaust valve clearance 0.45



### Section III. Section of the Size of Pulleys

The selection of the size of pulleys, when the engine is used to drive working machines other than walking tractors, directly affects the operating conditions of the engine and the productivity of the driven machine. The size of pulleys may be calculated according the following formulas:

$$D_2 = \frac{D_1 \times N_1}{N_2}$$

Where  $D_1$  is the diameter of the pulley on the engine shaft (use pitch diameter in case V-belt pulley is used);

$D_2$  the diameter of the pulley on the shaft of the driven machine;

$N_1$  the rotative speed of the engine;

$N_2$  the rotative speed of the driven machine.

One V-belt pulley with has a pitch diameter of 125mm is attached to the engine on its delivery from the factory. (The flat belt pulley with a diameter of some other size is available for special order through negotiation.)

### Section IV. Operation and Adjustment of the Engine

1. Use lubricating oil of grade HC-11 in summer, HC-8 in winter.

Caution: The oil level must not go over the upper line, nor fall down below the lower one, when the engine is in operation.

2. Use light diesel fuel, No.0 in summer, No-10 or No-20 in winter.

(1) Loosen the vent screw on the fuel injection pump. When it is noted that fuel with out air bubbles flows out, retighten the vent screw.

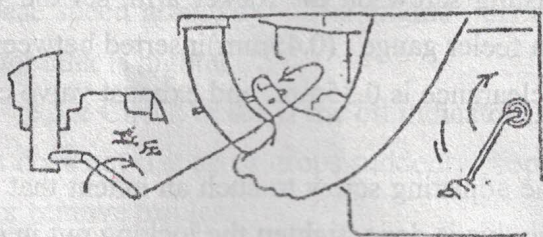
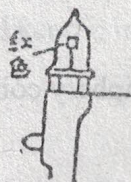
(2) Set the speed-control lever knob at the START position indicated on the panel. Screw off the plug on the gear casing, insert the fuel priming handle through the hole and move it to and fro until a chatterig action of the fuel injector is noted.

Caution: Pour clean diesel into the hopper, Do not get into any dust.

3. Pour clean water into the hopper, until the red ball of the float rises up to the highest position, Do not use dirty water or water which contains alkaline or salt.



## Starting the Engine



Set the speed-control lever knob at the START position indicated on the panel.

Move the decompression lever towards the right with your left hand and hold it, Crank the engine with your right hand by means of the starting handle and gradually speed up. When the cranking speed attains its maximum, suddenly re-

lease the decompression lever, but continue to crank the engine with effort.

After starting, check again the red float in the oil indicator and see if it rise up and allow the engine to run for 3-5 minutes at low speed without any load just after its being started, then increase the speed gradually and load the engine.

Caution:

Once the engine starts up running, the starting handle, because of the action of the spiral-jaws on its clutching end, will disengage and jerk out of itself, and therefore the operator must keep on holding it firmly in order to prevent any incident.

★ Running at high speed with load after its being started is strictly forbidden.

## Stopping the Engine

Unload the engine and let it run idle for a while. Move the speed-control lever knob to the STOP position, the engine will then stop running.

If the engine is to be put out of service for a long period of time.

1. Drain out the cooling water completely.
2. Turn the engine until the mark-line T.D.C. on the periphery of the flywheel coincides with the mark-line on the hopper.
3. Close the fuel cock.
4. Examine the oil in the air filter. If it becomes either dirty or diluted, it should be changed with clean oil, after both the filter cartridge and the filter body have been cleaned and wiped. The quantity of oil is such that its level is just up to the marked line inside the body.

5. Adjust the valve clearance to the specified value (Intake valve clearance-0.35mm, exhaust valve clearance-0.45mm).



## Adjustment of Valve Clearance

1. Turn the Flywheel until the mark T.D.C. on its periphery coincides with the line on the hopper.
2. Remove the cylinder head cover.
3. Loosen the locking nut and the adjusting screw on the rocker arm, set the valve clearance to the specified value by means of a feeler gauge (0.45mm) inserted between the valve stem and the rocker arm. (Intake valve clearance is 0.35mm. and exhaust valve clearance 0.45mm).
4. In the course of adjusting screw-in the adjusting screw to such an extent that push rod is just free to turn but not too loose. When this is done, tighten the locking nut in order to prevent any looseing afterwards.
5. Remove the feeler gauge and check the clearance once again.
6. Install the cylinder head cover to ensure normal operation of the decompression handle.

## Adjustment of Fuel Injection Timing

### Install

Disconnect the high pressure fuel pipe from the injector. Loosen the nut which connects the high pressure fuel pipe to the injection pump, turn the pipe around so that the open end of the pipe is upwards, and retighten the nut turn the flywheel slowly until the fuel just begins to flow out of the open end of the pipe. Stop turning and check whether the fuel injection timing mark-line on the periphery of the flywheel coincides with the mark-line on the hopper. In case they do not coincide with each other, adjustment is then necessary, Increase or decrease the number of shims between the pump flange and the mounting surface of the gear casing, according to whehter the injection timing is to be delayed or advanced. Caution: The ball of the plunger adjusting arm must be engaged with the slot in the speed-governing fork inside the gear casing.



3.2.4 Once the engine starts up running, the starting handle will disengage and slip out. Then operator should keep it in hand firmly to prevent any possible accident.

### 3.3 Running

3.3.1 After starting, make the engine running for 5-8 minutes at lower speed. then increase speed gradually. The engine runs with full load only when the temperature of the water tank is higher.

3.3.2 Check to see if the oil indicator is rising up. The lubrication system is abnormal if it does not rise up or drops suddenly, stop the engine at this time and fill lubricant oil fully or remove troubles.

3.3.3 It is normal that the cooling water is boiling when the engine is running.

Note: When the mark in float drops down to the inlet of the water tank, it is necessary to fill water in time.

3.3.4 Often view the colour of exhaust air when the engine is running. It is not allowed to run the engine when black smoke occurs. This necessary to decrease load or remove troubles in time.

3.3.5 It is not allowed to make the engine running with super load. Removing the fuel corrector to increase the power of the engine is strictly prohibited.

3.3.6 Stop the engine immediately of abnormal sound is heard when the engine is running, the check carefully.

3.3.7 During the period of first 50 hours when a new diesel engine is used, operate it carefully and do not run the engine with the largest load, Check again and retighten all loosened bolts and nuts after that period.

### 3.4 Stopping

3.4.1 Unload the engine and run it at lower speed for a while.

3.4.2 Set the throttle handle at the STOP position, the engine should go out itself.

Note: Stopping the engine with the decompression level is strictly prohibited.

3.4.3 Close the cock of the fuel tank



3.4.4 Drain out all cooling water in winter or when stopping the engine for a long time. Remove drain cock regularly to dredge water channel and remove dirt.

3.4.5 Set the exhaust valve closed to prevent vapour or impurities entering into the cylinder. The method so as follows:

3.4.5.1 Turn the flywheel until it can not be turned

3.4.5.2 Open the decompression level to continue turning the flywheel until its mark of T.D.C. is directly against the mark on the water tank.

3.4.6 Emergency stop

Loosen the connecting nuts on high-pressure fuel pipe or open the decompressor to stop the engine running at once if abnormal sound is heard suddenly or flying running occurs.

## 4. Maintenance of the Diesel Engine

Item	Description	Priod(hours)			
		8	50	100	300
diesel oil	check and fill diesel oil	△			
	clean and wash filling screen	△			
	clean and wash filter screen and oil filter			△	△
	clean and wash fuel tank				
Lubri cant oil	check and fill lubricant oil	△			
	clean and wash filter			△	
	replace with new oil and clean oil sump			△1*	
	clean and wash oil filter				△
cooling water	clean air filter				△2*
	check and fill water	△		*	
	drain out cooling water	△3*			
other	clean water channel				△4*
	adjust gaps of valves			△5*	
	check & tighten all important bolts & nuts				△
	check weariness of all moving parts				△

Notes:

1. Drain off dirt lubricant oil when it is warm ,clean the oil sump and fill new oil.



2. Air cleaner should be cleaned every 50 hours if more dust exists around the engine.
3. Drain off the cooling water at once after stopping the engine in winter to prevent engine and cylinder cover being frozen.
4. Remove the water tank and fill hydrochloric acid with a density of 25 per cent into water channel and keep it there for 20 minutes, then drain off it and clean channel with water again and again.
5. Check the gaps of valves in cold state every day. It should be 0.3-0.4mm for intake valve and 0.4-0.5mm for exhaust valve.

## 5. The method of trouble shooting and removing

### 5.1 Diesel engine starts difficultly or fails to start

Feature and Cause	Remedy
1. The weather is too cold	Fill warm water into watertank
2. Troubles in fuel system	
(1) Diesel oil is frozen	Warm up
(2) Water in diesel oil	Clean tank and pipe, replace diesel oil
(3) Air in fuel pipe	Exhaust air and tighten all pipe joints
(4) Troubles in injector: low injection pressure, needle valve blocked and carbon on jet	Clean, grind and replace fuel jet, adjust injection pressure to $18.13 \pm 0.49 \text{ Mpa}$ ( $185 \pm 5 \text{ kgf/cm}^2$ )
(5) fuel injection pump element worn	Replace fuel injection element
3. Compression force in cylinder is small	
(1) Nuts on cylinder cover are loosened and gasket is burnt	Tighten nuts on cylinder cover evenly and diagonally, replace cylinder gasket
(2) Piston ring, piston and cylinder liner are worn out badly	Replace piston ring, piston and cylinder liner
(3) Piston ring is stuck and broken	Clean, wash and replace
(4) Air-tightness between valve and seat is not good, leakage occurs	Grind
(5) Clearances of intake and exhaust valve are incorrect	Adjust clearance according to stipulations



Feature and Cause	Remedy
(6) Valve stem is blocked in guide bushing	Remove valve, wash valve and guide bushing with diesel oil
(7) Compression ratio is decreased due to more repairs	Replace valve seat
4. Advance angle of delivery is incorrect	Adjust it at $22^{\circ} \pm 1^{\circ}$ before T.D.C. according to stipulation
5. Viscosity of lubricant oil is thicker, speed could not be increased by hand	Replace lubricant oil with specific brand

## 5.2 Power is insufficient

Feature and Cause	Remedy
1. Troubles in fuel system (1) Diesel oil filter and fuel pipe blocked, fuel delivery is not smooth (2) Fuel delivery of pump is bad (3) Troubles in injector	Check diesel oil cock, clean oil filter and fuel pipe Repair or replace damaged parts of pump Refer to item 1.2.(4) of 5
2. Compression force in cylinder is small	Refer to item 1.3. of 5
3. Air filter clogged	Remove, clean or replace filter
4. Advance angle of fuel delivery is wrong	Adjust according to stipulation

## 5.3 Diesel engine stall

Feature and Cause	Remedy
1. Troubles in fuel system (1) Air in fuel system (2) Quality of diesel oil is bad or there is water in it (3) Needle valve in jet is blocked or injection pressure is much higher (4) Jet couple, injection pump coupler and fuel out let valve damaged	Remove air Refer to item 1.2(2) of 5 Refer to item 1.2(4) of 5 Replace damaged parts
2. Speed system blocked or adjust bolt on speed level worn out	Check or adjust the extension of bolt

1. Fuel
- (1) Suc
- high sp
- (2) Die
- is brok
2. Muc
- from ex
- (1) Pist
- (2) Valv
- (3) Cyli
- broken
- (4) Cyli
- down
- (5) Too
3. Press
- enough
- (1) Less
- (2) Oil in
- (3) Stato
- out
- (4) Lubri
- (5) Too l
- sides of
4. Oil pre
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5. Speed
- connectio



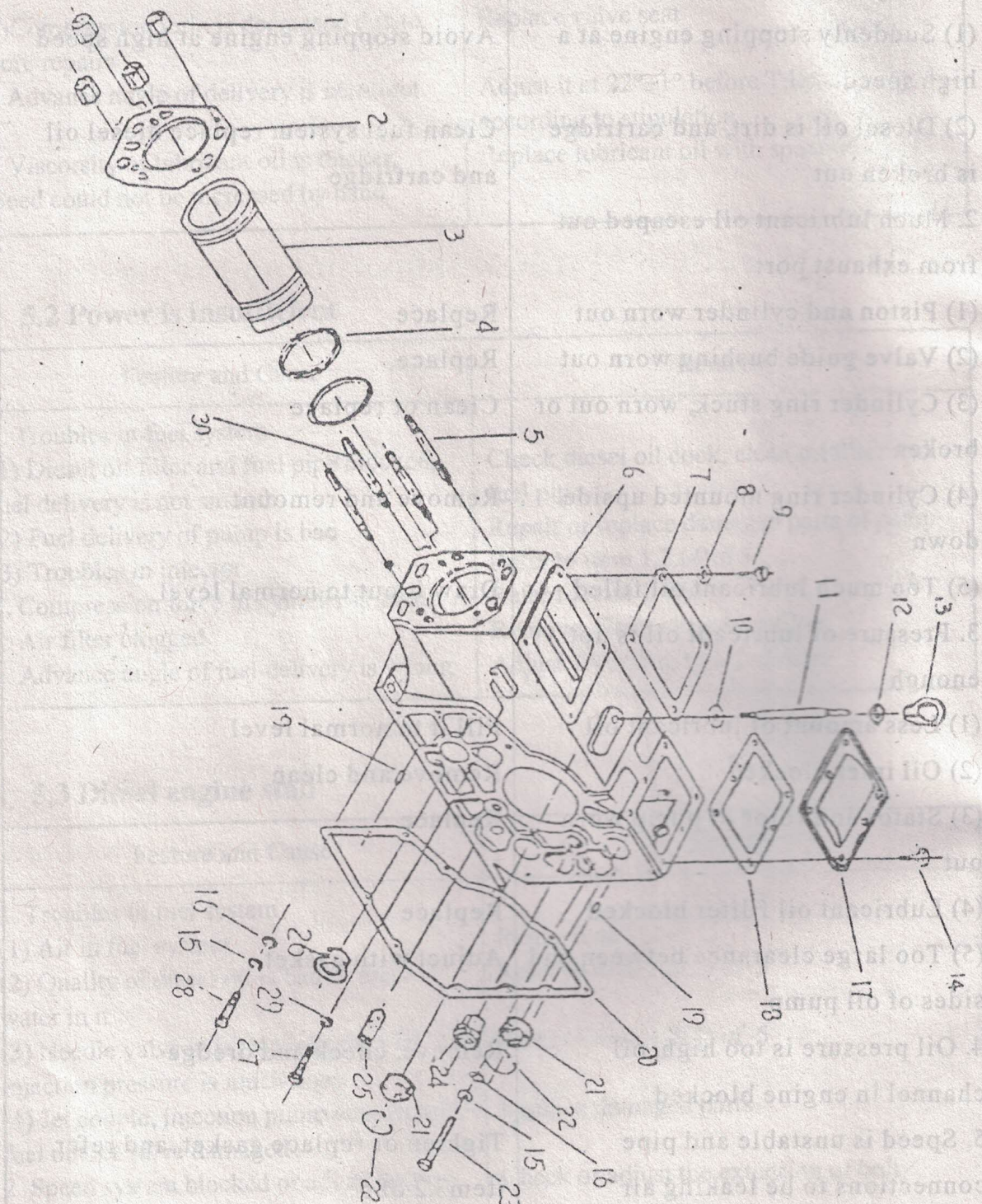
## 5.4 Others

Feature and Cause	Remedy
1. Fuel jet is often blocked	
(1) Suddenly stopping engine at a high speed	Avoid stopping engine at high speed
(2) Diesel oil is dirt, and cartridge is broken out	Clean fuel system replace diesel oil and cartridge
2. Much lubricant oil escaped out from exhaust port	
(1) Piston and cylinder worn out	Replace
(2) Valve guide bushing worn out	Replace
(3) Cylinder ring stuck, worn out or broken	Clean or replace
(4) Cylinder ring mounted upside down	Remove and remount
(5) Too much lubricant oil filled	Draw it out to normal level
3. Pressure of lubricant oil is not enough	
(1) Less amount of lubricant oil	Fill it to normal level
(2) Oil inlet blocked	Remove and clean
(3) Stator and rotor of pump worn out	Replace
(4) Lubricant oil filter blocked	Replace
(5) Too large clearance between end sides of oil pump	Adjust with gasket
4. Oil pressure is too high, oil channel in engine blocked	Remove, check and dredge
5. Speed is unstable and pipe connections to be leaking air	Tighten or replace gasket, and refer item 3.2 of 5



# PART TWO PARTS LIST WITH ILLUSTRATIONS

Fig. 1 Cylinder Block Assembly



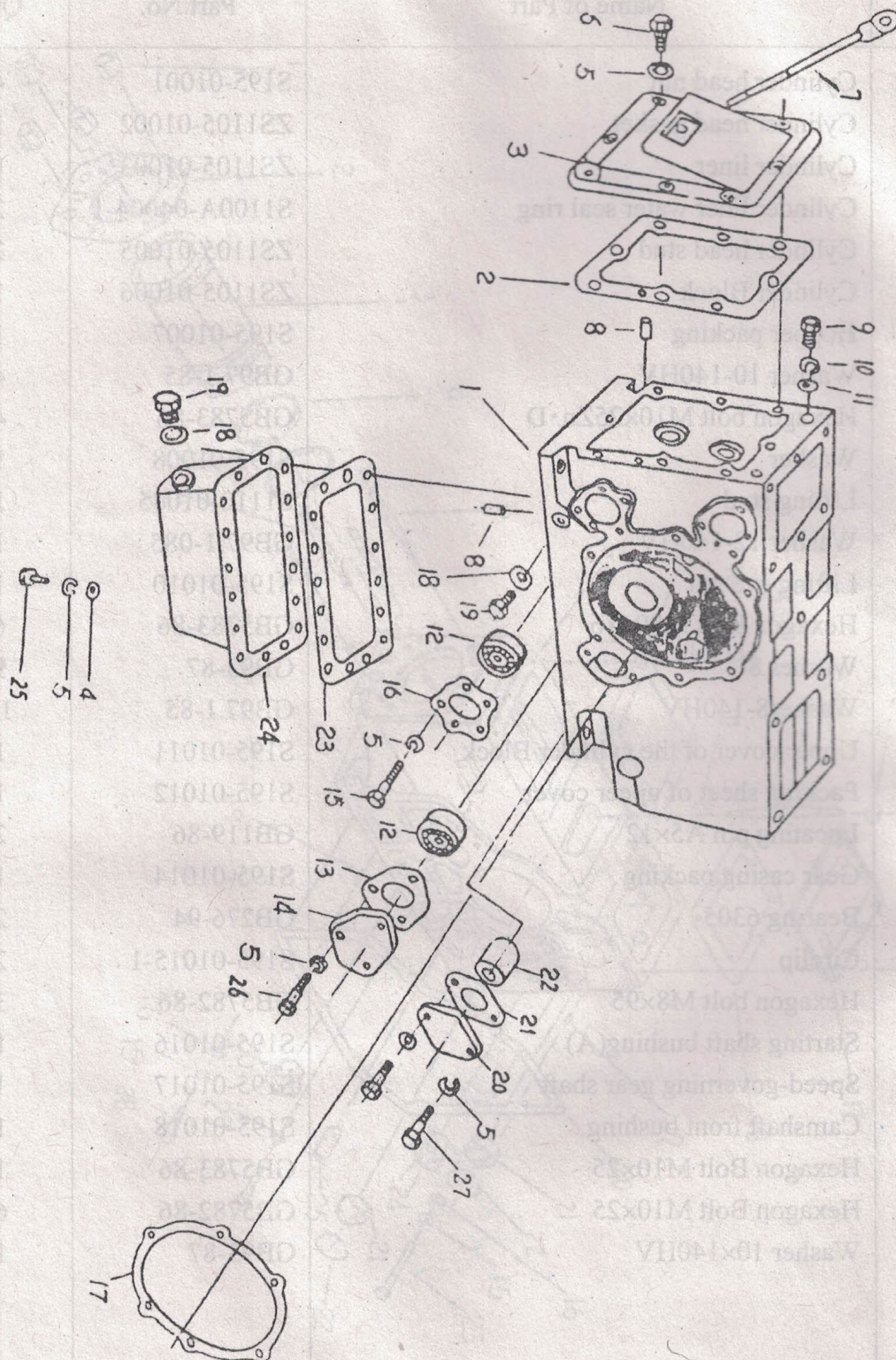


# Cylinder Block Assembly-1

Illus. No.	Name of Part	Part No.	Qty.
1	Cylinder head nut	S195-01001	4
2	Cylinder head gasket	ZS1105-01002	1
3	Cylinder liner	ZS1105-01003	1
4	Cylinder liner water seal ring	S1100A-04004-1	2
5	Cylinder head stud	ZS1105-01005	2
6	Cylinder Block	ZS1105-01006	1
7	Hopper packing	S195-01007	1
8	Washer 10-140HV	GB97.1-85	4
9	Hexagon bolt M10×25Zn·D	GB5783-86	4
10	Washer	S195-01008	1
11	Lifting stud	S1110-01005	1
12	Washer 12-140HV	GB97.1-085	1
13	Lifting eye nut	S195-01010	1
14	Hexagon Bolt M80×16	GB5783-86	6
15	Washer 8	GB93-87	9
16	Washer 8-140HV	GB97.1-85	15
17	Upper cover of the cylinder Block	S195-01011	1
18	Packing sheet of upeer cover	S195-01012	1
19	Locating pin A5×12	GB119-86	2
20	Gear casing packing	S195-01014	1
21	Bearing 6305	GB276-94	2
22	Circlip	S195-01015-1	2
23	Hexagon bolt M8×95	GB5782-86	3
24	Starting shaft bushing(A)	S195-01016	1
25	Speed-governing gear shaft	S195-01017	1
26	Camshaft front bushing	S195-01018	1
27	Hexagon Bolt M10×25	GB5783-86	1
28	Hexagon Bolt M10×25	GB5782-86	6
29	Washer 10×140HV	GB93-87	1



# Fig. II Cylinder Block Assembly





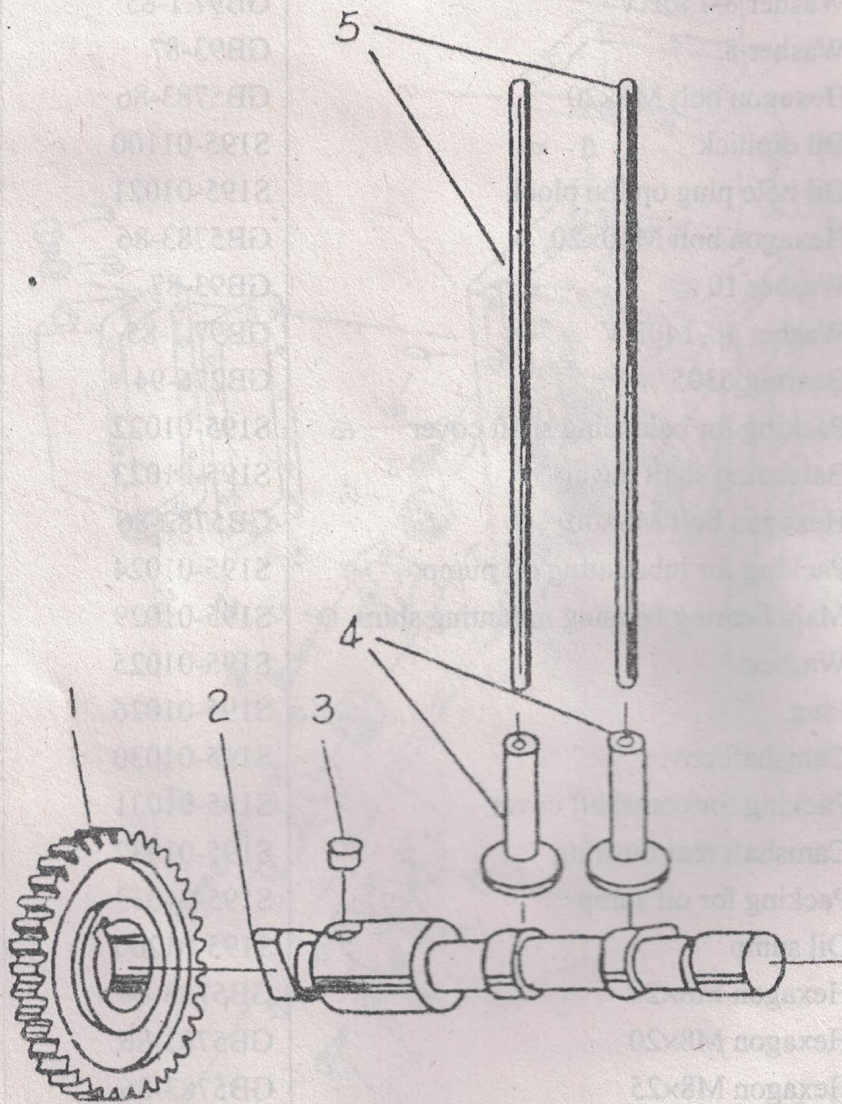
## Cylinder Block Assembly-2

Illus. No.	Name of Part	Part No.	Qty.
1	Cylinder block	ZS1105-01006	1
2	Packing of the rear cover	S195-01019	1
3	Rear cover	S195-01020	1
4	Washer 8-140HV	GB97.1-85	16
5	Washer 8	GB93-87	38
6	Hexagon bolt M8×20	GB5783-86	8
7	Oil dipitick	S195-01100	1
8	Oil hole plug on the block	S195-01021	2
9	Hexagon bolt M10×20	GB5783-86	2
10	Washer 10	GB93-87	2
11	Washer 10-140HV	GB97.1-85	2
12	Bearing 6305	GB276-94	2
13	Packing for balancing shaft cover	S195-01022	as required
14	Balancing shaft cover	S195-01023	1
15	Hexagon bolt M8×40	GB5782-86	3
16	Packing for lubricating oil pump	S195-01024	as required
17	Main bearing housing mounting shim	S195-01029	1
18	Washer	S195-01025	2
19	Plug	S195-01026	2
20	Camshaft cover	S195-01030	1
21	Packing for comshaft cover	S195-01031	1
22	Camshaft rear bushing	S195-01032	1
23	Packing for oil sump	S195-01033	1
24	Oil sump	S195-01200	1
25	Hexagon M8×20	GB5783-86	16
26	Hexagon M8×20	GB5783-86	3
27	Hexagon M8×25	GB5783-86	2



# Fig. III Camshaft Assembly

Qty.	Part No.	Name of Part	Illus. No.
1	721102-01006	Cylinder block	1
2	8192-01019	Packing of the rear cover	2
1	8192-01020	Rear cover	3
16	GB92-1-82	Washer 1.5x1.5	4
12	GB92-07	Washer 1.5x1.5	5
8	GB7363-80	Hexagon bolt 1.5x1.5	6
1	8192-01100	Oil drain	7
2	8192-01021	Oil pipe plug	8
2	GB7363-80	Hexagon bolt 1.5x1.5	9
2	GB92-07	Washer 1.5x1.5	10
2	GB92-07	Washer 1.5x1.5	11
2	GB92-07	Washer 1.5x1.5	12
1	8192-01022	Packing for the rear cover	13
1	8192-01023	Rear cover	14
1	8192-01024	Hexagon bolt 1.5x1.5	15
1	8192-01025	Washer 1.5x1.5	16
1	8192-01026	Washer 1.5x1.5	17
1	8192-01027	Washer 1.5x1.5	18
1	8192-01028	Washer 1.5x1.5	19
1	8192-01029	Washer 1.5x1.5	20
1	8192-01030	Washer 1.5x1.5	21
1	8192-01031	Washer 1.5x1.5	22
1	8192-01032	Washer 1.5x1.5	23
1	8192-01033	Washer 1.5x1.5	24
1	8192-01034	Washer 1.5x1.5	25
1	8192-01035	Washer 1.5x1.5	26
1	8192-01036	Washer 1.5x1.5	27



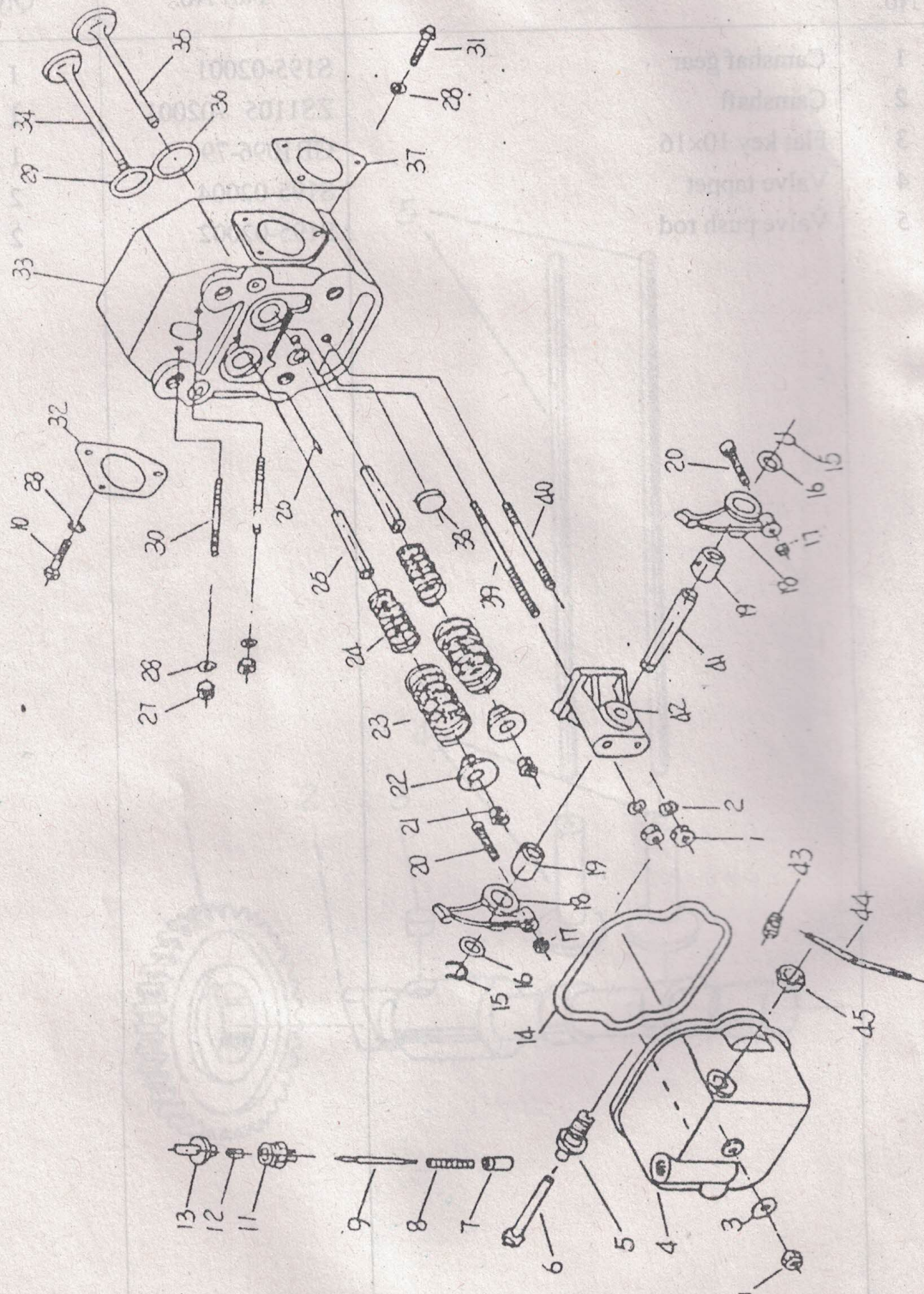


## Camshaft Assembly-3

Illus. No.	Name of Part	Part No.	Qty.
1	Camshaf gear	S195-02001	1
2	Camshaft	ZS1105 -02001	1
3	Flat key 10x16	GB1096-79	1
4	Valve tappet	S195-02004	2
5	Valve push rod	S195-02002	2



# Fig.IV Cylinder Head Assembly



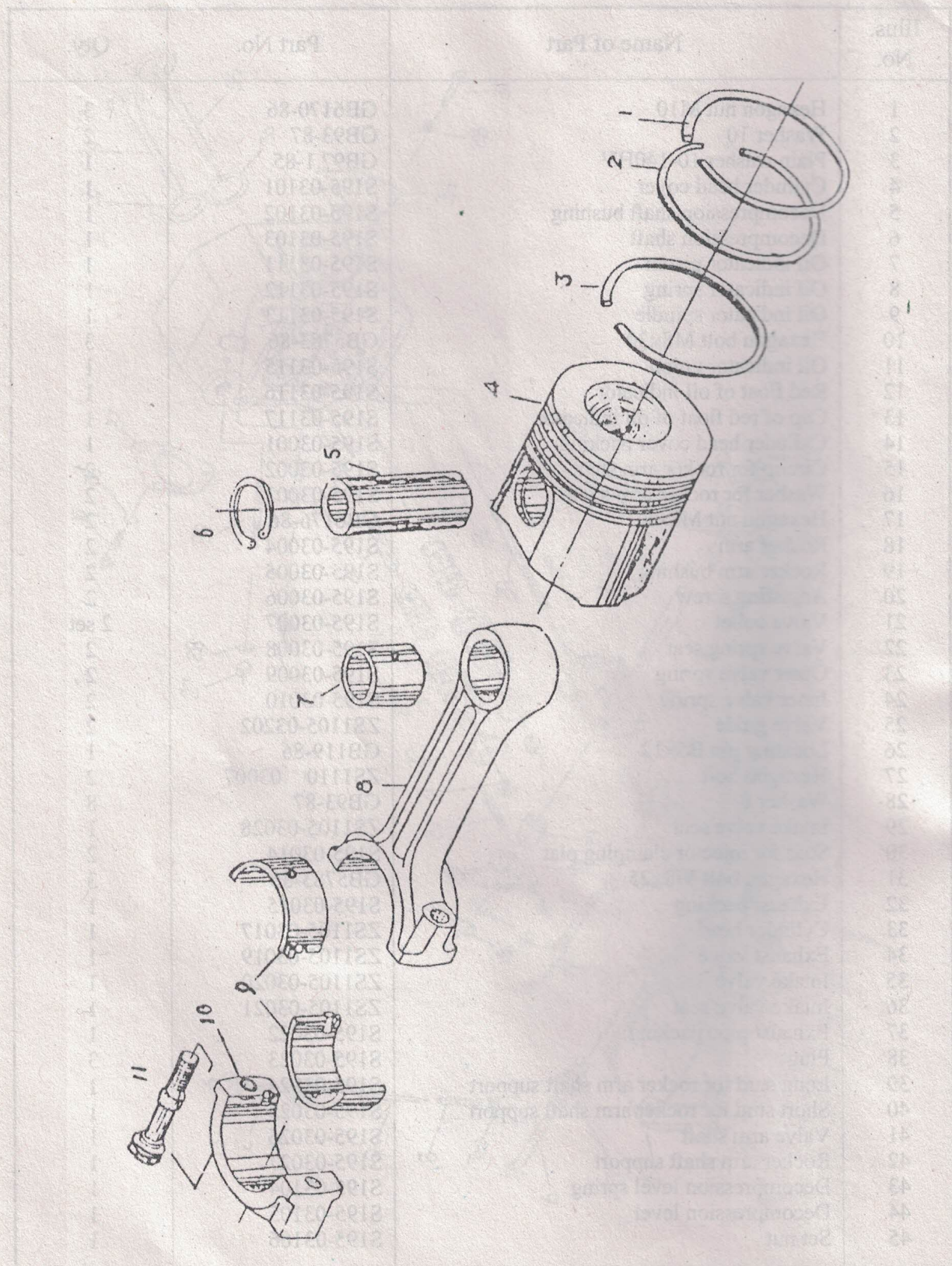


## Cylinder Head Assembly-4

Illus. No.	Name of Part	Part No.	Qty.
1	Hexagon nut M10	GB6170-86	3
2	Washer 10	GB93-87	2
3	Plain washer 10-140HV	GB97.1-85	1
4	Cylinder head cover	S195-03101	1
5	Decompression shaft bushing	S195-03102	1
6	Decompression shaft	S195-03103	1
7	Oil indicator piston	S195-03111	1
8	Oil indicator spring	S195-03112	1
9	Oil indicator spindle	S195-03113	1
10	Hexagon bolt M8×30	GB5783-86	3
11	Oil indicator union	S195-03115	1
12	Red float of oil indicator	S195-03116	1
13	Cap of red float of oil indicator	S195-03117	1
14	Cylinder head cover packing	S195-03001	1
15	Circlip for rocker arm shaft	S195-03002	2
16	Washer for rocker arm shaft	S195-03003	2
17	Hexagon nut M8×1	GB6176-86	2
18	Rocker arm	S195-03004	2
19	Rocker arm bushing	S195-03005	2
20	Adjusting screw	S195-03006	2
21	Valve collet	S195-03007	2
22	Valve spring seat	S195-03008	2 set
23	Outer valve spring	S195-03009	2
24	Inner valve spring	S195-03010	2
25	Valve guide	ZS1105-03202	2
26	Locating pin B5×12	GB119-86	1
27	Hexagon bolt	ZS1110 03007	2
28	Washer 8	GB93-87	8
29	Intake valve seat	ZS1105-03028	1
30	Stud for injector clamping plat	S195-03014	2
31	Hexagon bolt M8×25	GB5783-86	3
32	Exhaust packing	S195-03015	1
33	Cylinder head	ZS1105-03017	1
34	Exhaust valve	ZS1105-03019	1
35	Intake valve	ZS1105-03020	1
36	Intake valve seat	ZS1105-03021	1
37	Exhaust pipe packing	S195-03022	1
38	Plug	S195-03023	3
39	Long stud for rocker arm shaft support	S195-03024	1
40	Short stud for rocker arm shaft support	S195-03025	1
41	Valve arm shaft	S195-03026	1
42	Rocker arm shaft support	S195-03027	1
43	Decompression level spring	S195-03104	1
44	Decompression level	S195-03105	1
45	Set nut	S195-03106	1



# Fig. V Piston and Connecting Rod Assembly



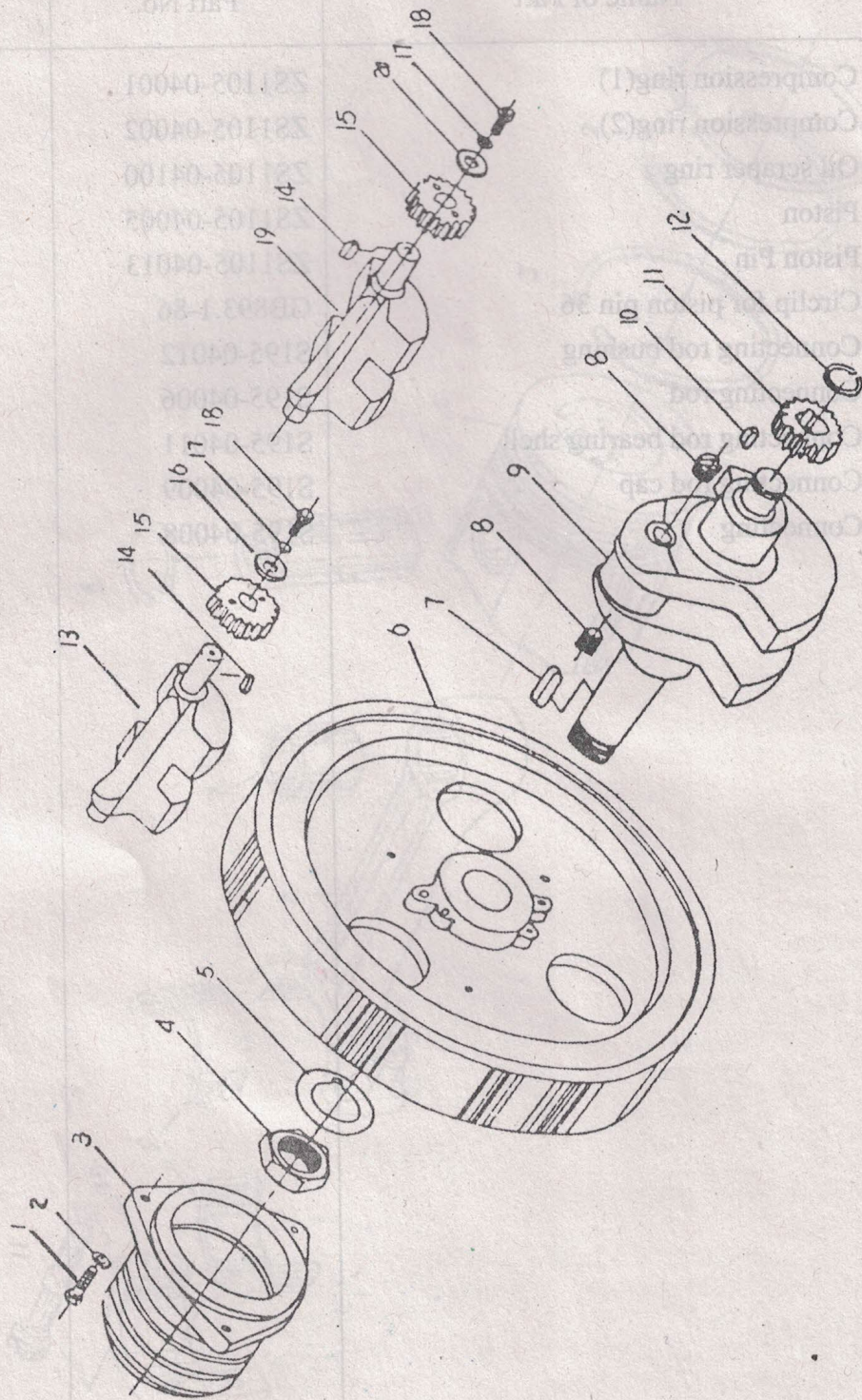


## Piston and Connecting Rod Assembly-5

Illus. No.	Name of Part	Part No.	Qty.
1	Compression ring(1)	ZS1105-04001	1
2	Compression ring(2)	ZS1105-04002	1
3	Oil scraper ring	ZS1105-04100	1
4	Piston	ZS1105-04005	1
5	Piston Pin	ZS1105-04013	1
6	Circlip for piston pin 36	GB893.1-86	2
7	Connecting rod bushing	S195-04012	1
8	Connecting rod	S195-04006	1
9	Connecting rod bearing shell	S195-04011	2
10	Connecting rod cap	S195-04009	1
11	Connecting	S195-04008	2



**Fig.IV Flywheel Crankshaft and Balancing Mechanism**





## Flywheel Crankshaft and Balancing Mechanism-6

Illus. No.	Name of Part	Part No.	Qty.
1	Hexagon Bolt M12×35	GB5783-86	3
2	Spring washer 12	GB93-87	3
3	V-Belt puller	S1100A-05001	1
4	Flywheel nut	S195-05002	1
5	Lock washer	S195-05003	1
6	Flywheel	S195-05004	1
7	Flat key 12×40	GB1096-79	1
8	Crankshaft screw plug	S195-05007	2
9	Crankshaft	ZS1105-05006	1
10	Flat key 8×18	GB1096-79	1
11	Crankshft timing gear	S195-05009	1
12	Circlip 30	GB894.1-86	1
13	Upper balancing shaft	S195-05010	1
14	Flat key C6×16	GB1096-79	2
15	Balancing shaft gear	S195-05012	2
16	Washer	S195-05013	1
17	Spring washer 8	GB93-87	2
18	Hexagon bolt M8×16	GB5783-86	2
19	Lower balancing shaft	S195-05014	1
20	Washer	S195-05013	1



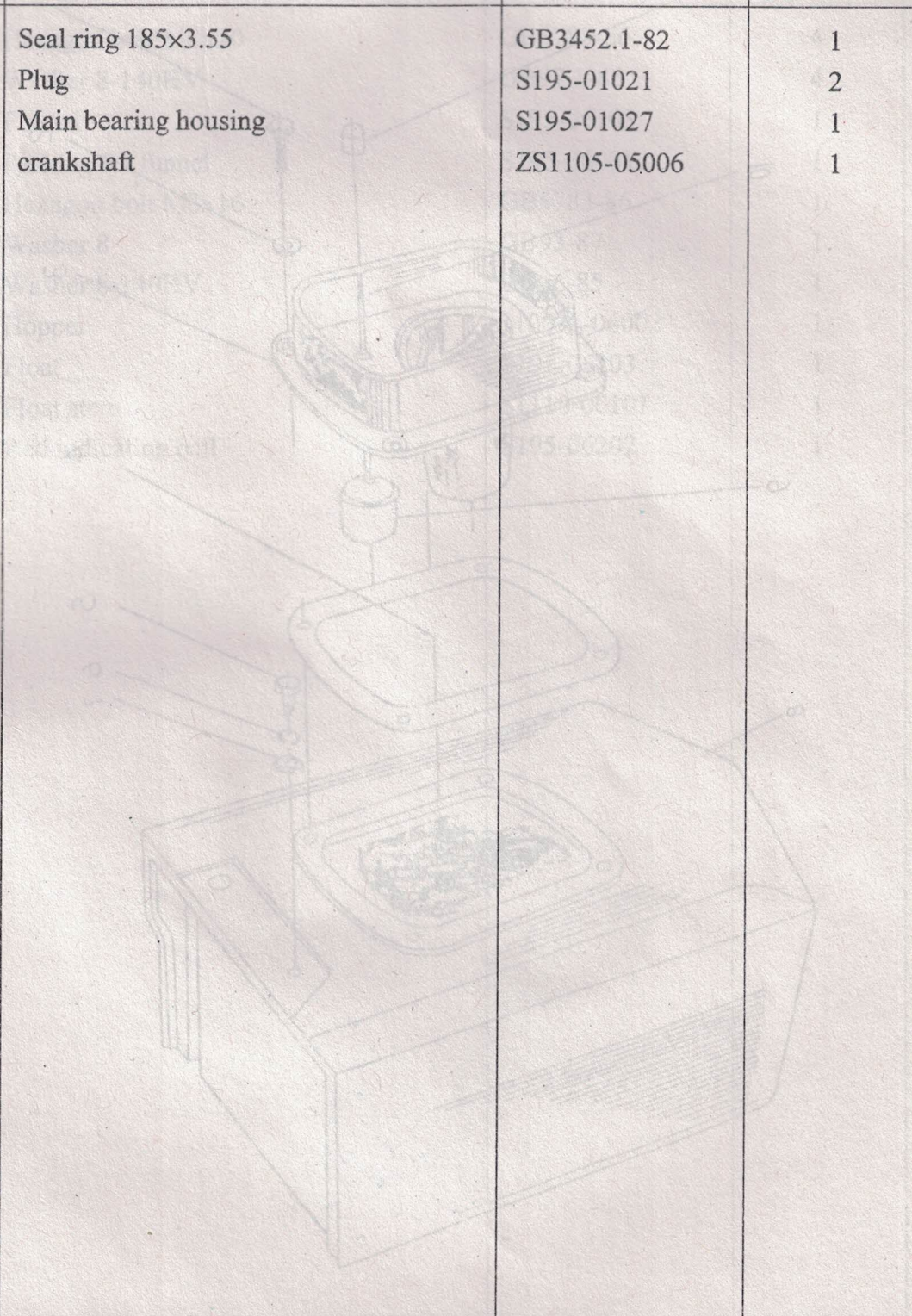
Fig.VII Flywheel Crankshaft and Balancing Mechanism

QTY	Part No	Name of Part
3	GB7283-86	Hexagon Bolt M12x35
3	GB93-87	Spring washer 12
1	21160A-02001	V-Belt pulley
1	2192-02002	Flywheel nut
1	2192-02003	Lock washer
1	2192-02004	Flywheel
1	006-29	Flat key 12x40
2	2192-02007	Crankshaft screw plug
1	231102-02006	Crankshaft
1	GB1036-85	Flat key 8x18
1	2192-02009	Crankshaft timing gear
1	GB893-88	Circum 30
1	2192-02010	Upper balancing chain
2	GB1096-79	Flat key 6x16
2	2192-02012	Balancing shaft gear
1	2192-02013	Washer
2	93-87	Spring washer 8
2	GB7283-86	Hexagon bolt M8x10
1	2192-02014	Lower balancing chain
1	2192-02015	Washer



## Flywheel Crankshaft and Balancing Mechanism-7

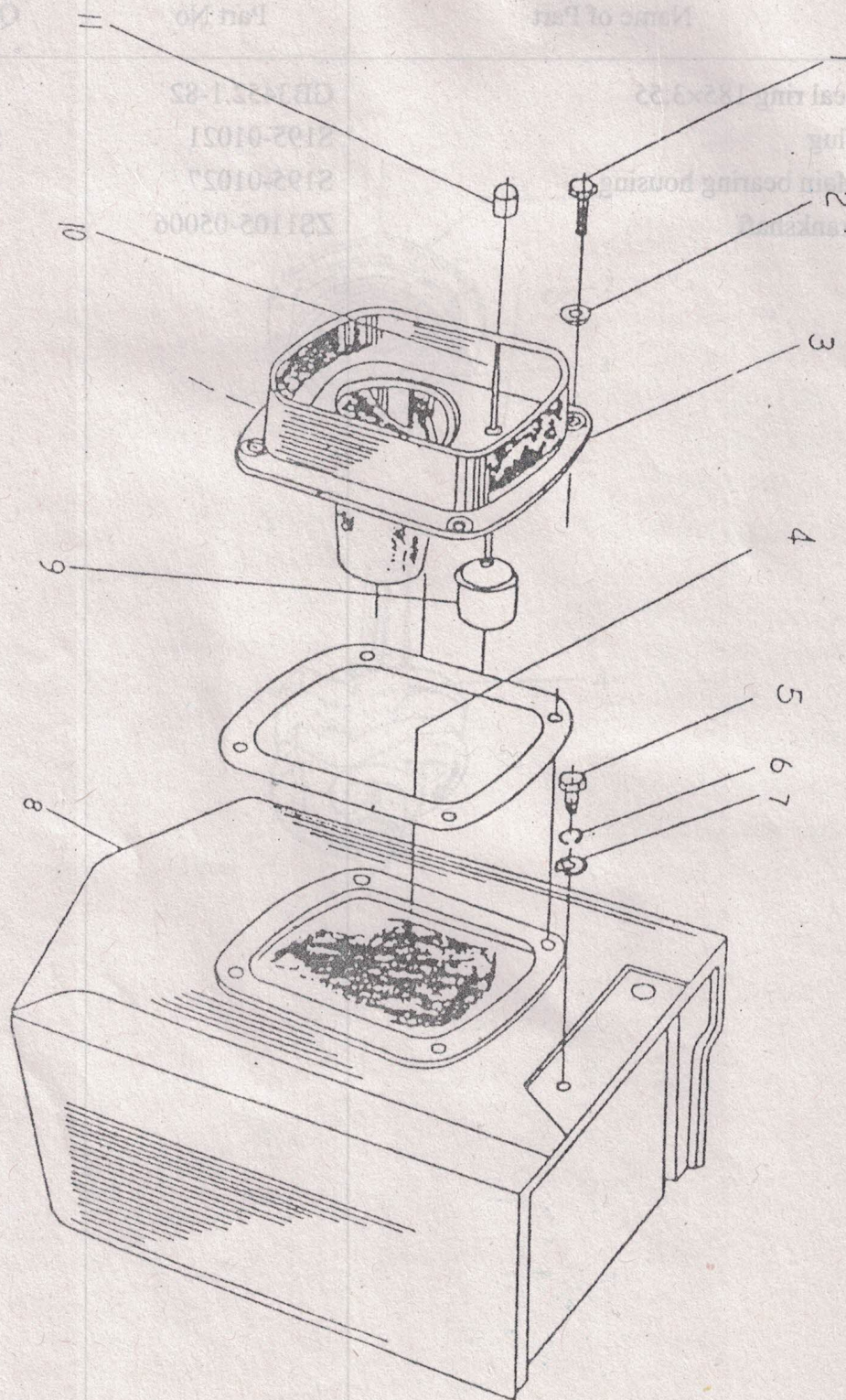
Illus. No.	Name of Part	Part No.	Qty.
1	Seal ring 185×3.55	GB3452.1-82	1
2	Plug	S195-01021	2
3	Main bearing housing	S195-01027	1
4	crankshaft	ZS1105-05006	1



The diagram is an exploded view showing the assembly of the flywheel crankshaft and balancing mechanism. It includes a main bearing housing (part 3) at the base, a crankshaft (part 4) in the middle, and a flywheel assembly (part 1) at the top. A plug (part 2) is shown as a separate component. The parts are numbered 1 through 4, corresponding to the table. The diagram shows the relative positions and assembly sequence of the components.



# Fig.VIII Hopper Assembly



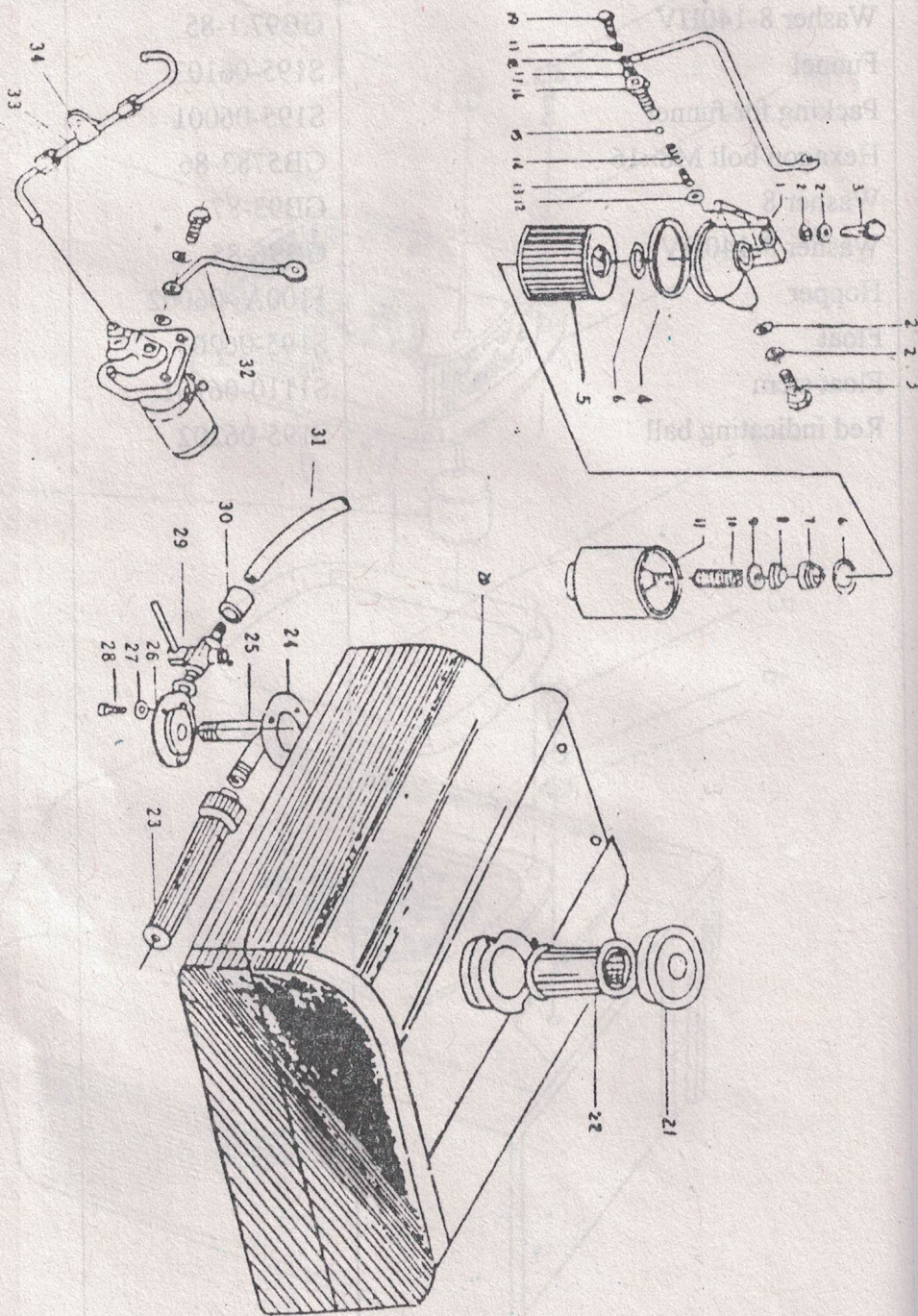


## Hopper Assembly-8

Illus. No.	Name of Part	Part No.	Qty.
1	Hexagon bolt M8×20	GB5783-86	4
2	Washer 8-140HV	GB97.1-85	4
3	Funnel	S195-06103	1
4	Packing for funnel	S195-06001	1
5	Hexagon bolt M8×16	GB5783-86	1
6	Washer 8	GB93-87	1
7	Washer 8-140HV	GB96-85	1
8	Hopper	1100A <sub>2</sub> -06002	1
9	Float	S195-06203	1
10	Float stem	S1110-06101	1
11	Red indicating ball	S195-06202	1



# Fig. IX Fuel System



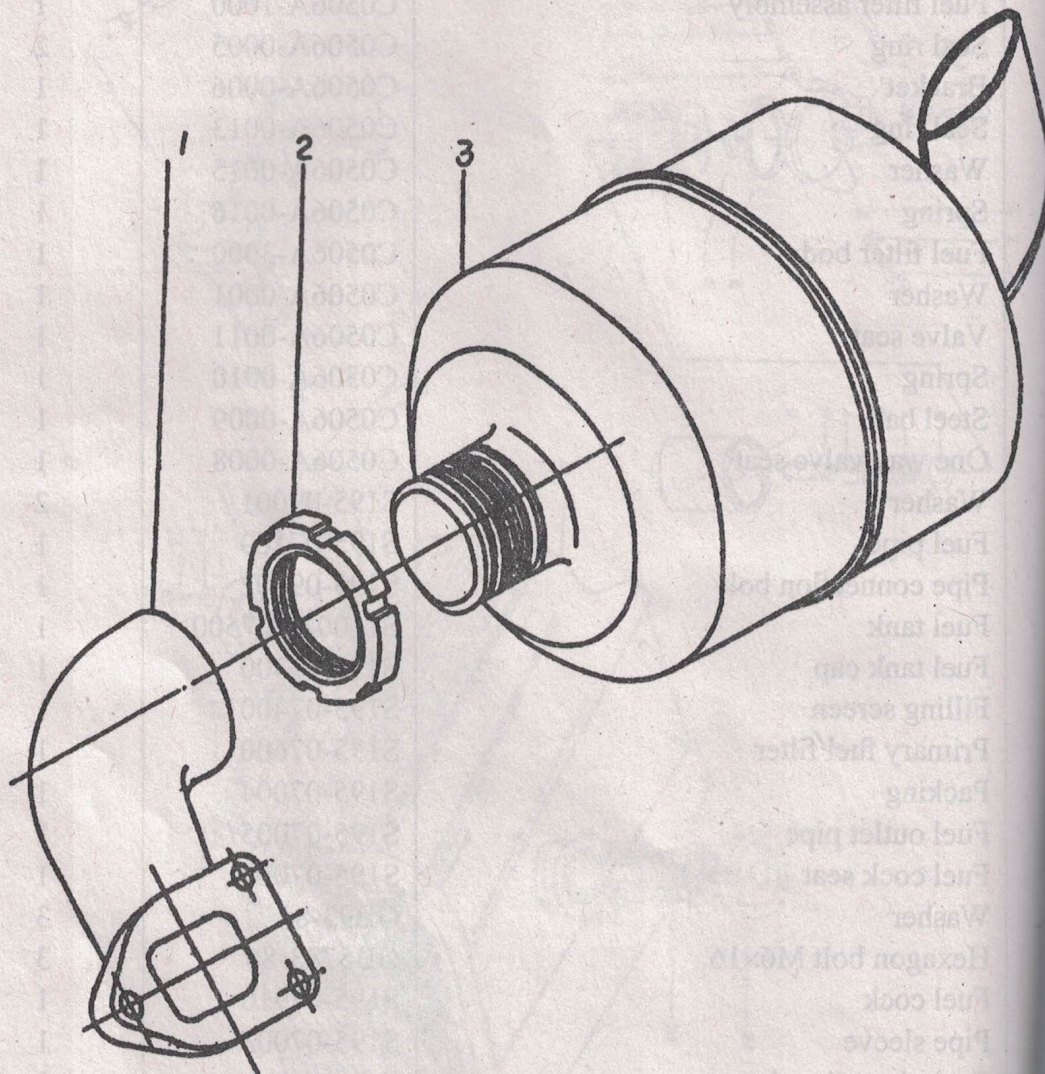


## Fuel System-9

Illus. No.	Name of Part	Part No.	Qty.
1	Fuel filter seat	C0506B-0002	1
2	Washer	S195-07204	4
3	Pipe connection bolt M12	195-07203	3
4	Seal ring	C0506A-0003	1
5	Fuel filter assembly	C0506A-1000	1
6	Seal ring	C0506A-0005	2
7	Bracket	C0506A-0006	1
8	Seal ring	C0506A-0013	1
9	Washer	C0506A-0015	1
10	Spring	C0506A-0016	1
11	Fuel filter body	C0506A-3000	1
12	Washer	C0506A-0001	1
13	Valve seat	C0506A-0011	1
14	Spring	C0506A-0010	1
15	Steel ball	C0506A-0009	1
16	One way valve seat	C0506A-0008	1
17	Washer	S195-09001	2
18	Fuel pipe	S195-07100	1
19	Pipe connection bolt	S195-09002	1
20	Fuel tank	S1100A <sub>2</sub> -07500	1
21	Fuel tank cap	S195-07300	1
22	Filling screen	S195-07400	1
23	Primary fuel filter	S195-07600	1
24	Packing	S195-07004	1
25	Fuel outlet pipe	S195-07005	1
26	Fuel cock seat	S195-07006	1
27	Washer	GB93-87	3
28	Hexagon bolt M6×16	GB5783-86	3
29	Fuel cock	S195-07910	1
30	Pipe sleeve	S195-07003	1
31	Fuel pipe oil resistant	Oil resistant	1
32	Pipe welding	ZS1105-07300	1
33	High pressure fuel pipe and its accessories	ZS1105-07200	1
34	Pipe clip	S195-07205	1



# Fig. X Exhaust System



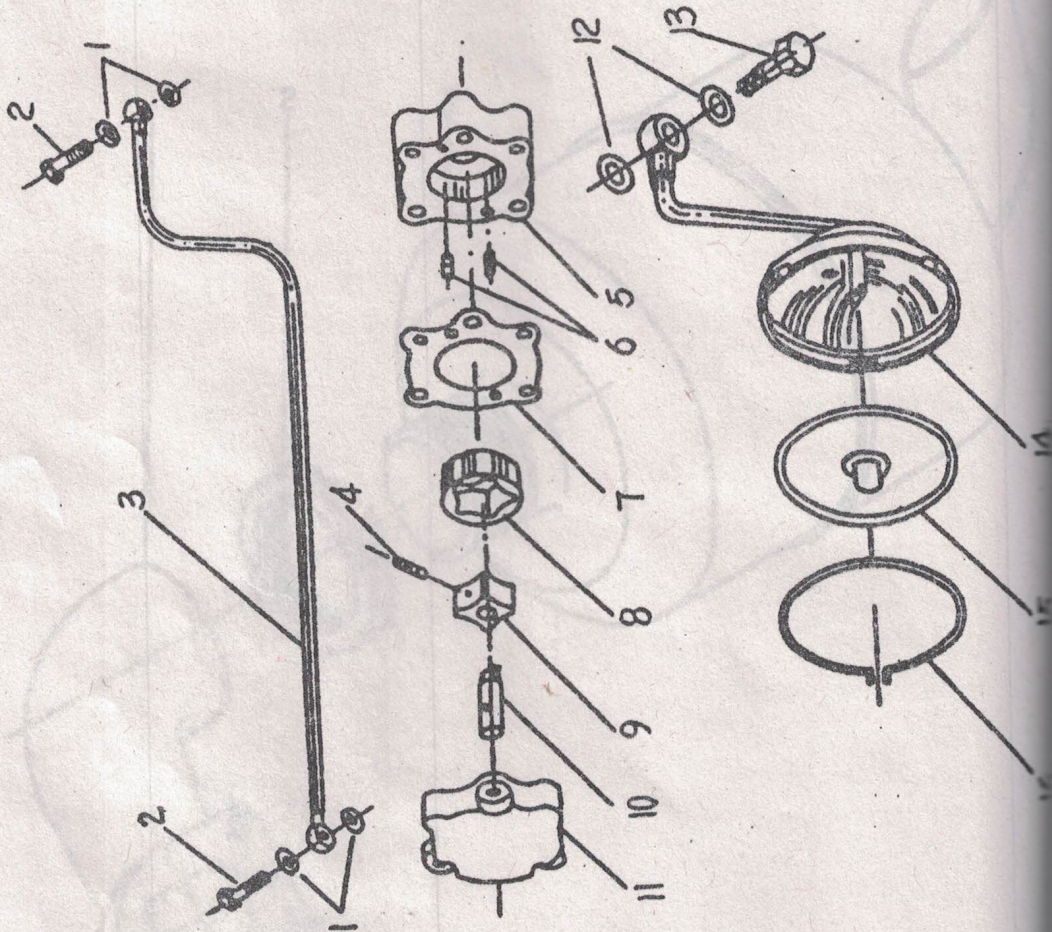


# Exhaust System-10

Illus. No.	Name of Part	Part No.	Qty.
1	Exhaust pipe	195-08002	1
2	Lock nut	195-08001	1
3	Silencer	195-08100-1	1
4	Exhaust pipe	195-09201	1
5	Lubricating oil pump body	S195-09202	1
6	Locating pin	GB119-86	1
7	Lubricating oil pump packing shim	S195-09203	1
8	Exhaust rotor	S195-09204	1
9	Exhaust rotor	S195-09205	1
10	Exhaust shaft	S195-09206	1
11	Oil pump	S195-09207-1	1
12	Oil pump	S195-09208	2
13	Oil pump	S195-09209	1
14	Oil pump body with gasket plate	S195-09210	1
15	Oil pump	S195-09211	1
16	Oil pump	S195-09212	1
17	Oil pump	S195-09213	1
18	Oil pump	S195-09214	1
19	Oil pump	S195-09215	1
20	Oil pump	S195-09216	1
21	Oil pump	S195-09217	1
22	Oil pump	S195-09218	1
23	Oil pump	S195-09219	1
24	Oil pump	S195-09220	1
25	Oil pump	S195-09221	1
26	Oil pump	S195-09222	1
27	Oil pump	S195-09223	1
28	Oil pump	S195-09224	1
29	Oil pump	S195-09225	1
30	Oil pump	S195-09226	1
31	Oil pump	S195-09227	1
32	Oil pump	S195-09228	1
33	Oil pump	S195-09229	1
34	Oil pump	S195-09230	1
35	Oil pump	S195-09231	1
36	Oil pump	S195-09232	1
37	Oil pump	S195-09233	1
38	Oil pump	S195-09234	1
39	Oil pump	S195-09235	1
40	Oil pump	S195-09236	1
41	Oil pump	S195-09237	1
42	Oil pump	S195-09238	1
43	Oil pump	S195-09239	1
44	Oil pump	S195-09240	1
45	Oil pump	S195-09241	1
46	Oil pump	S195-09242	1
47	Oil pump	S195-09243	1
48	Oil pump	S195-09244	1
49	Oil pump	S195-09245	1
50	Oil pump	S195-09246	1
51	Oil pump	S195-09247	1
52	Oil pump	S195-09248	1
53	Oil pump	S195-09249	1
54	Oil pump	S195-09250	1
55	Oil pump	S195-09251	1
56	Oil pump	S195-09252	1
57	Oil pump	S195-09253	1
58	Oil pump	S195-09254	1
59	Oil pump	S195-09255	1
60	Oil pump	S195-09256	1
61	Oil pump	S195-09257	1
62	Oil pump	S195-09258	1
63	Oil pump	S195-09259	1
64	Oil pump	S195-09260	1
65	Oil pump	S195-09261	1
66	Oil pump	S195-09262	1
67	Oil pump	S195-09263	1
68	Oil pump	S195-09264	1
69	Oil pump	S195-09265	1
70	Oil pump	S195-09266	1
71	Oil pump	S195-09267	1
72	Oil pump	S195-09268	1
73	Oil pump	S195-09269	1
74	Oil pump	S195-09270	1
75	Oil pump	S195-09271	1
76	Oil pump	S195-09272	1
77	Oil pump	S195-09273	1
78	Oil pump	S195-09274	1
79	Oil pump	S195-09275	1
80	Oil pump	S195-09276	1
81	Oil pump	S195-09277	1
82	Oil pump	S195-09278	1
83	Oil pump	S195-09279	1
84	Oil pump	S195-09280	1
85	Oil pump	S195-09281	1
86	Oil pump	S195-09282	1
87	Oil pump	S195-09283	1
88	Oil pump	S195-09284	1
89	Oil pump	S195-09285	1
90	Oil pump	S195-09286	1
91	Oil pump	S195-09287	1
92	Oil pump	S195-09288	1
93	Oil pump	S195-09289	1
94	Oil pump	S195-09290	1
95	Oil pump	S195-09291	1
96	Oil pump	S195-09292	1
97	Oil pump	S195-09293	1
98	Oil pump	S195-09294	1
99	Oil pump	S195-09295	1
100	Oil pump	S195-09296	1



# Fig. XI Lubrication System



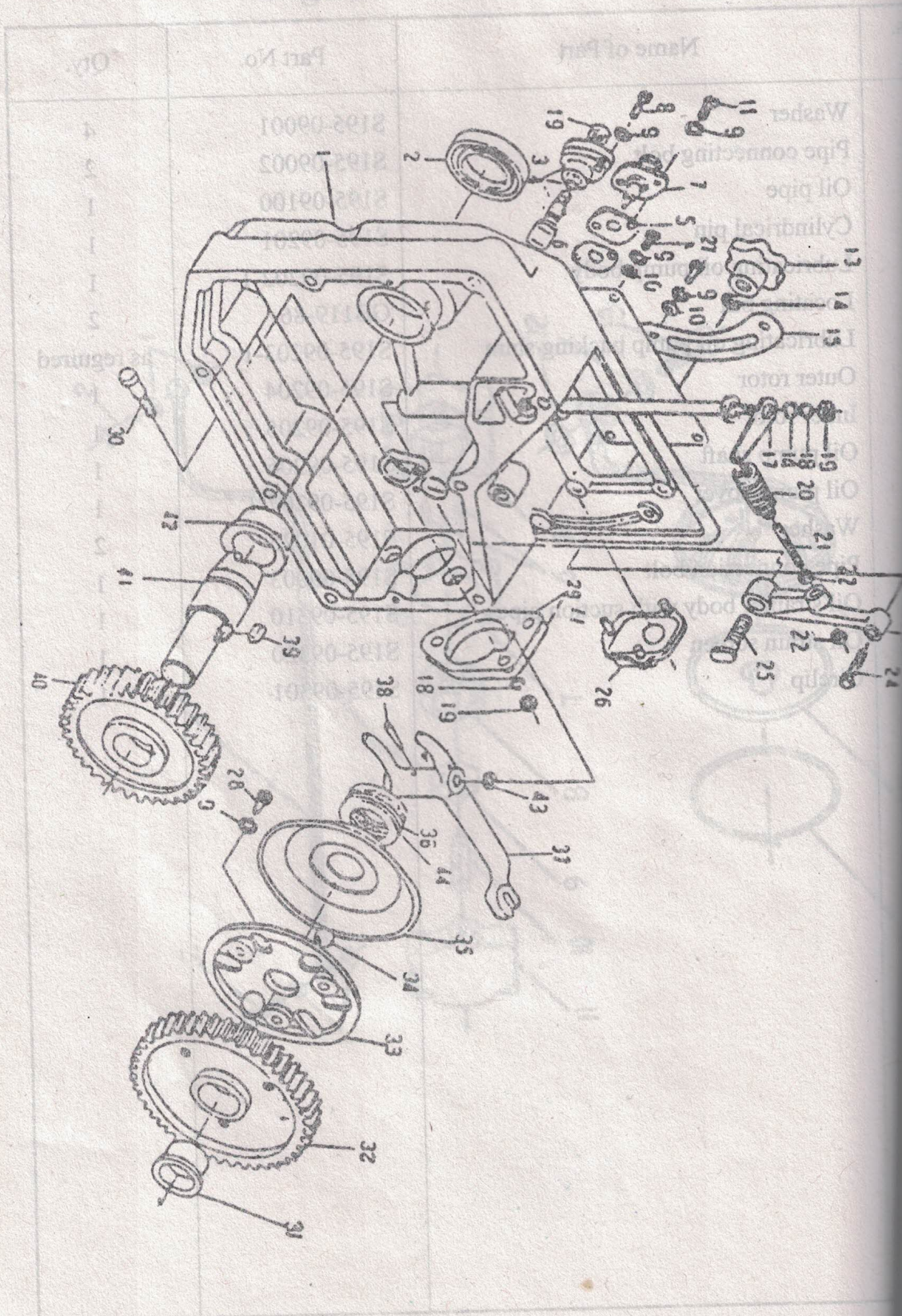


# Lubrication System-11

Illus. No.	Name of Part	Part No.	Qty.
1	Washer	S195-09001	4
2	Pipe connecting bolt	S195-09002	2
3	Oil pipe	S195-09100	1
4	Cylindrical pin	S195-09201	1
5	Lubricating oil pump body	S195-09202-1	1
6	Locating pin	GB119-86	2
7	Lubricating oil pump packing shim	S195-09203-1	as required
8	Outer rotor	S195-09204	1
9	Inner rotor	S195-09205	1
10	Oil pump shaft	S195-09206	1
11	Oil pump cover	S195-09207-1	1
12	Washer	S195-01025	2
13	Pipe connection bolt	S195-09003	1
14	Oil strainer body with suction pipe	S195-09310	1
15	Oil strain screen	S195-09320	1
16	Circlip	S195-09301	1
24	Washer bolt 4x40		
25	Fixed screw		
26	Breathing pipe connection		
27	Button head cap screw		
28	Button head cap screw		
29	Shim for fuel injection pump		as required
30	Fuel injection pump mounting bolt		3
31	Governor gear bearing		1
32	Governor gear		1
33	Governor ball spacer		1
34	Steel ball		6
35	Governor ball race		1
36	Single direction thrust ball bearing		1
37	Governor fork		1
38	Taper pin 4x25	GB117-86	1
39	Flat key 8x6	GB1096	1
40	Starting gear	S195-10030	1
41	Starting gear shaft	S195-10031	1
42	Starting gear shaft bearing(B)	S195-10032	1
43	Adjusting washer	S195-10033	as required
44	Parting for governor ball race	S195-10034	as required
Note: If the fuel limiter (No. 7) is not provided, it will be replaced by a cover (195-10063)			



# Fig.XII Gear Casing Assembly





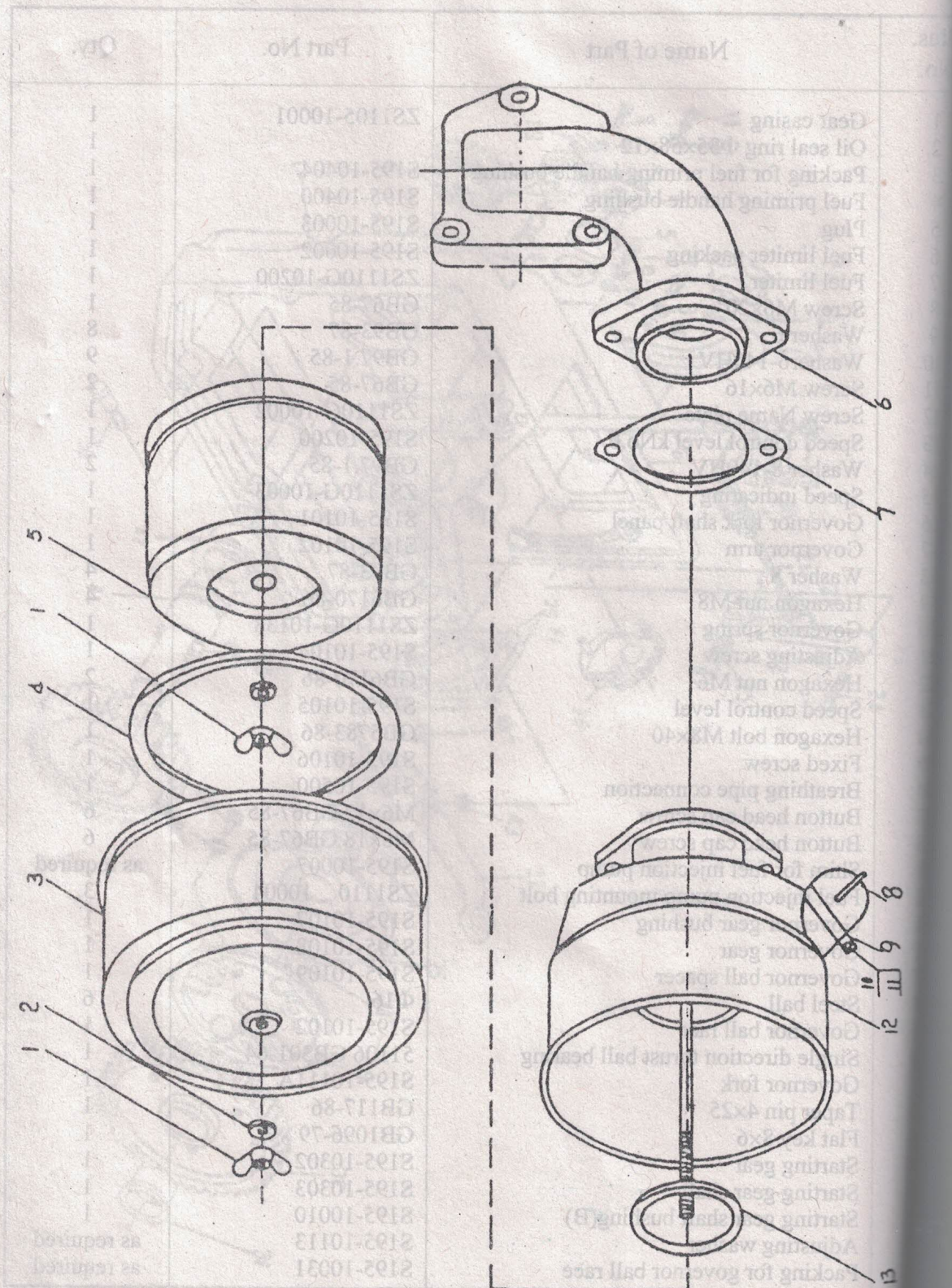
## Gear Casing Assembly-12

Illus. No.	Name of Part	Part No.	Qty.
1	Gear casing	ZS1105-10001	1
2	Oil seal ring $\Phi 35 \times 58 \times 12$		1
3	Packing for fuel priming handle bushing	S195-10404	1
4	Fuel priming handle bushing	S195-10400	1
5	Plug	S195-10003	1
6	Fuel limiter packing	S195-10002	1
7	Fuel limiter	ZS1110G-10200	1
8	Screw M6x20	GB67-85	1
9	Washer 6	GB93-87	8
10	Washer 6-140HV	GB97.1-85	9
11	Screw M6x16	GB67-85	2
12	Screw Name plate	ZS1110G-10002	1
13	Speed control level kNo.b	S195-10200	1
14	Washer 8-140HV	GB97.1-85	2
15	Speed indicating	ZS1110G-10003	1
16	Governor fork shaft panel	S195-10101	1
17	Governor arm	S195-10102	1
18	Washer 8	GB93-87	4
19	Hexagon nut M8	GB6170-86	4
20	Governor spring	ZS1110G-10138	1
21	Adjusting screw	S195-10104	1
22	Hexagon nut M6	GB6170-86	2
23	Speed control level	S195-10105	1
24	Hexagon bolt M8x40	GB5783-86	1
25	Fixed screw	S195-10106	1
26	Breathing pipe connection	S195-10500	1
27	Button head cap screw	M6x12 GB67-85	6
28	Button head cap screw	M6x18 GB67-85	6
29	Shim for fuel injection pump	S195-10007	as required
30	Fuel injection pump mounting bolt	ZS1110 10004	3
31	Governor gear bushing	S195-10107	1
32	Governor gear	S195-10108	1
33	Governor ball spacer	S195-10109	1
34	Steel ball	$\Phi 16$	6
35	Governor ball race	S195-10102	1
36	Single direction thrust ball bearing	51106 GB301-64	1
37	Governor fork	S195-10111A	1
38	Taper pin 4x25	GB117-86	1
39	Flat key 8x6	GB1096-79	1
40	Starting gear	S195-10302	1
41	Starting gear shaft	S195-10303	1
42	Starting gear shaft bushing(B)	S195-10010	1
43	Adjusting washer	S195-10113	as required
44	Packing for governor ball race	S195-10031	as required

Note: If the fuel limiter(No.7) is not provided, it will be replaced by a cover (195-10003)



# Fig. X III Intake System



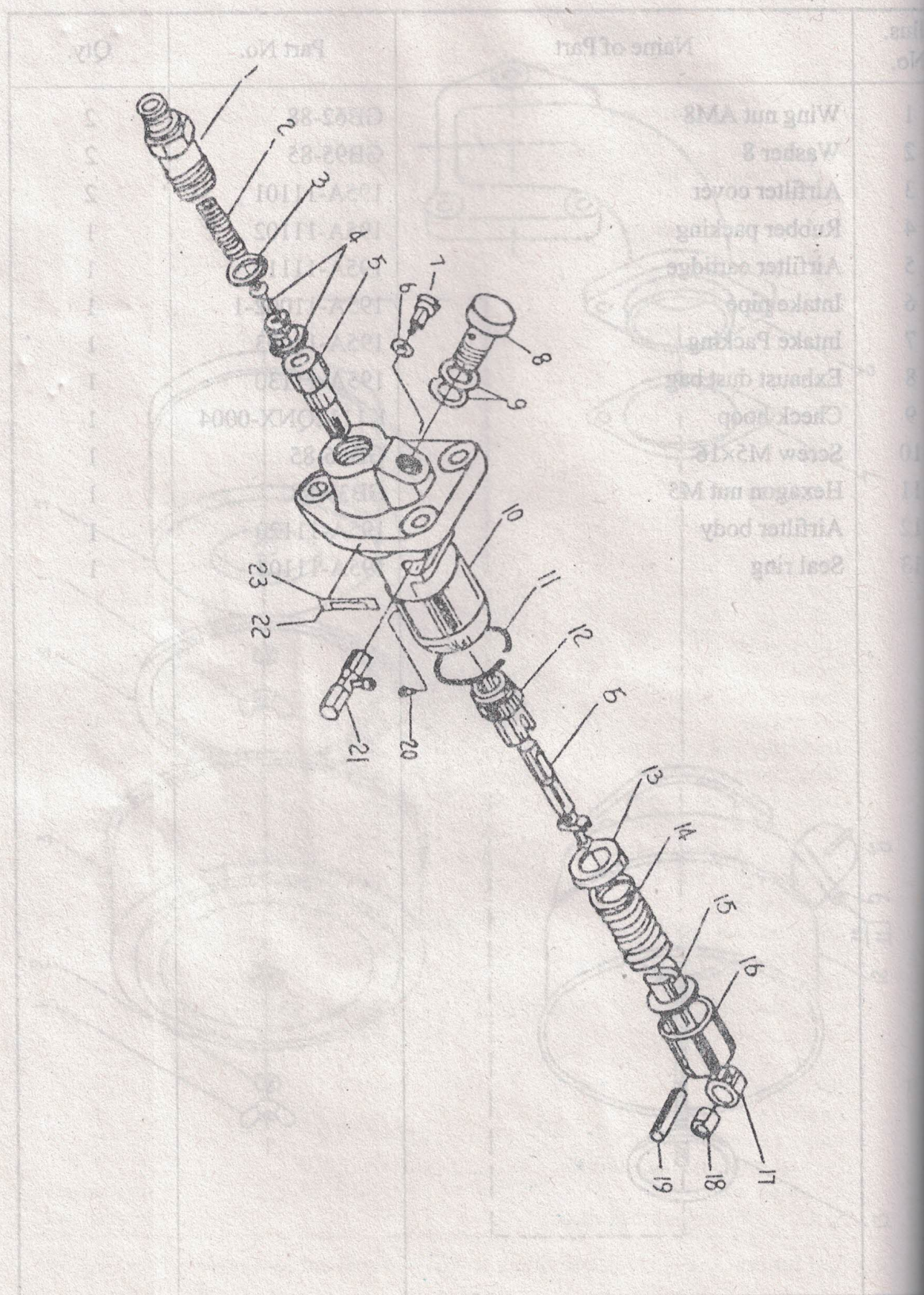


# Intake System-13

Illus. No.	Name of Part	Part No.	Qty.
1	Wing nut AM8	GB62-88	2
2	Washer 8	GB95-85	2
3	Airfilter cover	195A-11101	2
4	Rubber packing	195A-11102	1
5	Airfilter cartridge	195A-11110	1
6	Intake pipe	195A-11002-1	1
7	Intake Packing	195A-11003	1
8	Exhaust dust bag	195A-11130	1
9	Check hoop	K1112QNX-0004	1
10	Screw M5x16	GB66-85	1
11	Hexagon nut M5	GB39-88	1
12	Airfilter body	195A-11120	1
13	Seal ring	195A-11104	1



# Fig. X IV Fuel Injection Pump



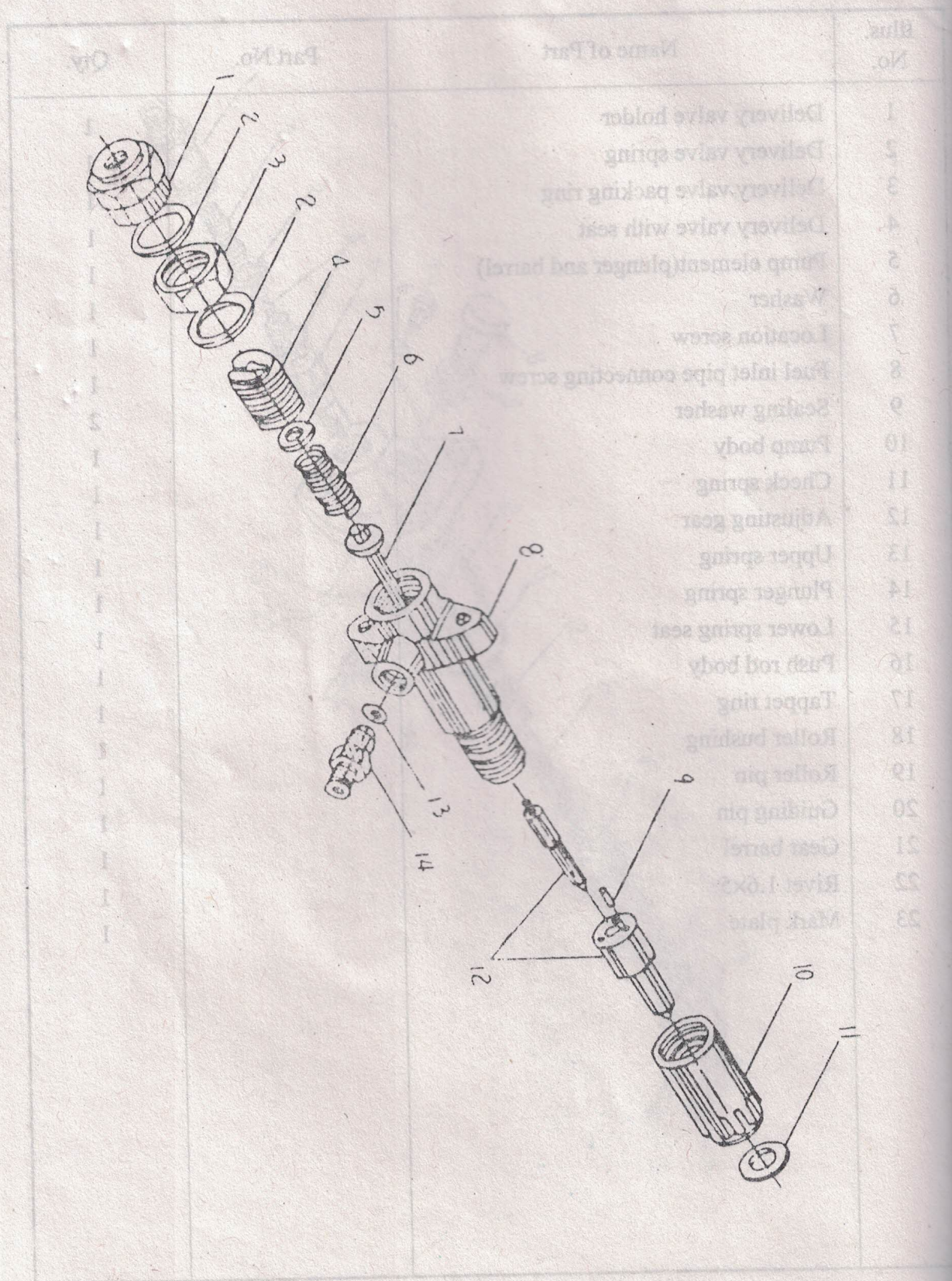


## Fuel Injection Pump-14

Illus. No.	Name of Part	Part No.	Qty.
1	Delivery valve holder		1
2	Delivery valve spring		1
3	Delivery valve packing ring		1
4	Delivery valve with seat		1
5	Pump element(plunger and barrel)		1
6	Washer		1
7	Location screw		1
8	Fuel inlet pipe connecting screw		1
9	Sealing washer		2
10	Pump body		1
11	Check spring		1
12	Adjusting gear		1
13	Upper spring		1
14	Plunger spring		1
15	Lower spring seat		1
16	Push rod body		1
17	Tappet ring		1
18	Roller bushing		1
19	Roller pin		1
20	Guiding pin		1
21	Gear barrel		1
22	Rivet 1.6x5		1
23	Mark plate		1



# Fig. X V PF68S19 Fuel Injector









## Appendix I List of Tools Supplied with the Engine

No.	Name	Quantity
1	Hexagon wrench 60(special wrench for flywheel nut)	1
2	Hexagon wrench 27(special wrench for cylinder head nuts)	1
3	Double-open-end wrench 13×16	1
4	Double-open-end wrench 18×21	1
5	Feeler gauge(for measuring and adjusting valve clearance)	1
6	Starting handle	1
7	Special wrench for connecting rod bolts	1
8	Bridge of puler(for dismantling flywheel and balancing shaft gears)	1
9	Valve lapping tool, complete	1
10	Screw driver 6"	1
11	Lapping paste	1
12	Screw AM6×30 GB67-85(for removing flywheel key from crankshaft)	1
13	Bolt M8×60 GB5782-86(for dismantling balancing shaft gears)	2
14	Bolt M10×85 GB5782-86(for dismantling flywheel)	2

## Appendix II List of Spare Parts Supplied with the Engine

No.	Name of spart part	Unit	Quantity
1	Cylinder head gasket ZS1105-01002	piece	1
2	Piston rings ZS1105-04001,04002,04100	set	1
3	Fuel filter element C0506A-1000	piece	1