



Please read this
operation Instructions,
before operating

S195 SERIES DIESEL ENGINE OPERATION MANUAL

Changfa Power Machinery Co.,Ltd

Changzhou, Jiangsu P.R. China



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.

Thanks for your choosing *Changfa* Brand diesel engine

Before operating ,please read this Operation Instiutions

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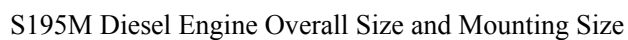
Precautions

1. Don't touch the heating and turning parts.
2. Don't let those people enter into the operating place, for the children, slow-action old man, epileptic or the man who has no disposing capacity.
3. Don't make the engine operate for a long time without operator.
4. As for the performance, please read the performance specification attached for reference Don't operate the engine in over-speed and over-load.
5. After starting, allow the engine idle operating in 3~5minutes and it is prohibited to run the engine in high speed and over-load.
6. Don't set the adjusting screw of governor system to make the engine operate in over speed.
7. Don't shutdown the engine by means of push down decompression lever unless heavy accident happens
8. Don't feed the salt-water or dirty water into water tank.
9. Feed and replace the fuel and lubricating oil stipulated in Operation Manual.
10. Feed the lubricating oil in air filter according to the requirement of Operation Manual.
11. Ensure that the red(blue) floater is not below the hopper of water tank during its boiling water operation.
12. As soon as engine starts, starting handle leave off automatically. It is necessary to hold the starting handle to avoid it to fly out.
13. In the climate below 0°C, to prevent the cylinder block and head from breaking, the cooling water should be drained in good time.
14. Firmly fasten the connections between the engine and the working machine and take the necessary protecting measure in pulley belt area.
15. If there are some trouble occurring, keep the damaged site in original situation and settle it after consultation between sales agent and repairman.
16. Run in and maintain the engine according to the requirements of Operation Manual.

As the diesel engine is now improving constantly, and there maybe some difference between the manual and the diesel engine, and we will correct it when we revise the manual, Please forgive us for this matter.

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Section I . General Description

S195 SERIES Diesel engine is the single cylinder, horizontal, 4-stroke, and water cooling diesel engine. Having the advantages of light weight, compact construction, easy transport, simple installation, little vibration, 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 a prime mover for small electrical generators, air compressors, small river ship-propulsion and motor vehicles.

Normal and reliable operation of this 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 engine power and give a good service.

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Section II . Principal Technical Specifications

Model		S195(M)	S195N(M)	S195B
Type		Single-cylinder, four-stroke, Water cooling, horizontal type		
Cylinder bore		95mm		
Piston stroke		115mm		
Piston displacement		0.815L		
12-hour power		8.82kW	8.32 kW	9.7kW
1-hour power		9.7kW	9.48 kW	10.8 kW
Rating rotation speed		2000r/min		2200r/min
Compression ratio		20		
B. M. E. P.		650kPa	613kPa	650kPa
Specific Fuel consumption		$\leq 258.4 \text{ g/kW} \cdot \text{h}$	$\leq 265.2 \text{ g/kW} \cdot \text{h}$	$\leq 259.8 \text{ g/kW} \cdot \text{h}$
Injection pressure		$12.75 \pm 0.5 \text{ MPa}$		$13.5 \pm 0.5 \text{ MPa}$
Cooling method		Water-evaporation	Water radiator	Water-evaporation
Starting method		Hand cranking (motor starting)		
Net. Weight		$\leq 145 \text{ kg}$ (155kg)	$\leq 150 \text{ kg}$ (155kg)	$\leq 145 \text{ kg}$ (155kg)
Overall dimensions	Hand cranking	814×480×618	814×490×713	814×480×618
	motor starting	942×480×680	942×480×713	942×480×680
Valve clearance (cold engine)		Intake valve $0.35 \pm 0.05 \text{ mm}$		
		Exhaust valve $0.45 \pm 0.05 \text{ mm}$		
Torque of cylinder head nut		270 N · m ~ 285 N · m		
Torque of flywheel nut		350 N · m ~ 450 N · m		
Torque of connecting rod bolts		88 N · m ~ 110 N · m		
Fuel injector type		P21-10N		
Fuel injector nozzle		ZS4S1		
Fuel injection pump type		P72-4 fuel injection pump		
Fuel filter type		C0506B		
Generator		Flywheel AC generator		
Air filter		According to the requirement of customer		
Valve Timing	Intake valve open	17° before T. D. C.		
	Intake valve close	43° after B. D. C.		
	Exhaust valve open	43° before B. D. C.		
	Exhaust valve close	17° after T. D. C.		
Fuel injection timing		$18^\circ \pm 1^\circ$ before T. D. C.		

Section III. Selection of the Size of Pulleys

When the flywheel of diesel engine is connected with working machine, the selection of the size of pulleys, directly affects the operation conditions of the engine and the productivity of the driven machine. The size of pulleys may be calculated according to the following formulas:

$$D_2 = \frac{D_1 \times n_1}{n_2}$$

Where:

D_1 is the diameter of the engine pulley (The diameter of V-belt used for pulley is calculated by the pitch diameter, mm);

D_2 is the diameter of the pulley on the shaft of the driven machine (The diameter of V-belt used for pulley is calculated by the pitch diameter, mm);

n_1 is the rotation speed of the engine;

n_2 is the rotation speed of the driven machine.

One V-belt pulley with pitch diameter of 125mm is attached to the engine on its delivery from the factory (If the pulleys of special size are required, it can be ordered through negotiation.).

Section IV. Operation and Adjustment of the Engine

(1)、Preparation

1. Lubricating oil

Use lubricating oil #CC15W/40 in summer, #CC15W/30 in winter.

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

2. Diesel fuel

Use light diesel fuel #0 in summer, #-10 or #-20 in winter.

(1) Loosen the vent screw on the fuel injection pump or loosen the fuel pipe connection. When it is noted that fuel without air bubbles flows out, retighten the vent screw or connections.

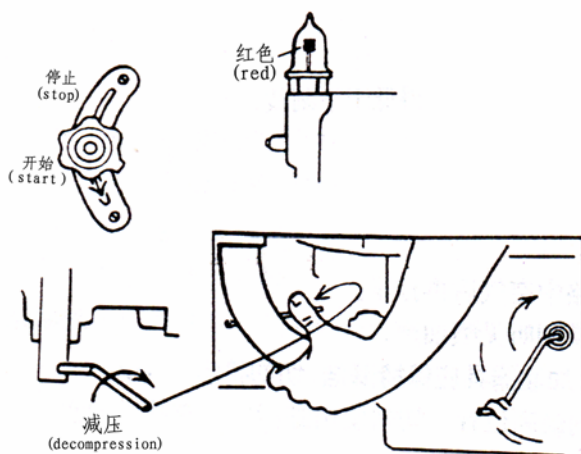
(2) Set the speed — control lever knob at the “start” position indicated on the panel. Screw off the plug on the gear casing, insert the fuel priming handle through the hole and move it to and fro until a “chattering” action of the fuel injector is noted.

Caution: Pour clean diesel fuel into the fuel tank. Do not get into any dust.

3. Cooling water

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

(2)、Starting the Engine



Set the speed — control lever knob at the “start” position indicated on the panel.

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

but continue to crank the engine with effort. Then the engine will start running itself.

After starting, check again the red float in the oil indicator and see if it rises 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 full load after its being started is strictly forbidden.

(3)、Stopping the Engine

Gradually 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 fail to turn it, then push down the decompression lever and continue to turn the flywheel 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 — $0.35 \pm 0.05\text{mm}$, exhaust valve clearance — $0.45 \pm 0.05\text{mm}$).

(4)、Adjustment of Valve Clearance

1. Turn the Flywheel until the mark T.D.C. on its periphery coincides with the line marked on the hopper, in order to set the piston at its top dead center position in compression stroke.
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 inserted between the valve stem and the rocker arm. (Intake valve clearance is 0.35 mm. 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 loosening 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.

(5)、Adjustment of Fuel Injection Timing

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. Turning the flywheel slowly, Until the fuel just begins to flow out of the open end of the pipe. Stop turning and check whether the mark — line on the periphery of the flywheel coincides with the mark line on to hopper, In case the injection timing is too advanced or too lagging behind, adjustment is then necessary. Increase or decrease the number of shims between the pump flange and mounting surface of gear casing. Increase the number of shims if injection timing is advanced, decrease the number of shims if lagging.

Caution : The ball of the plunger adjusting arm must be engaged with the slot in the speed — governing fork inside the gear casing.

Section V. Defects and Elimination

A. Engine Fails to Start

Cause	Remedy
1. Unsteady fuel flow	Check the fuel tank and the element of the fuel filter whether there is any water or dirt. Clean the element in clean fuel if it is choked with dirt, or clean the fuel tank and fill it with clean fuel of recommended grade if any water is found in the tank.
2. Air in the fuel pipe line	Release air and then tighten all fuel pipe connections.
3. Fuel injection timing incorrect	Adjust according to the recommended procedure.
4. Valve clearance incorrect	Adjust according to the recommended procedure.
5. In cold weather, lubricating oil becomes too viscous, difficult to crank the engine	Pour hot water into the hopper, or preheat the lubricating oil before pouring it into the oil sump, but do not heat the oil sump with external fire. It is also advisable to disconnect the engine from the driven machine by pulling off the belt, then start the engine. Stop it after the engine has been warmed up, repute the belt on and start the engine again.
6. Insufficient compression in the cylinder	The wearing - out of intake and exhaust valves, as well as of piston, piston rings and cylinder liner is the main factor to give rise to in sufficient compression. Pouring about 25 grams of lubricating oil into the intake manifold will be of some assistance to increasing the compression pressure in the cylinder. If leakage at the cylinder head gasket occurs, it is then necessary to tighten the cylinder head nuts. Any worn gasket should be replaced
7. Pumping element (plunger and barrel) of the injection pump or injector nozzle worn-out	Replace with new one.

B. Engine Does Not Develop Full Power

Cause	Remedy
1. Insufficient compression in the cylinder	Proceed as item 6 under “Engine Fails to Start.” If parts are worn, in excess of the specified wear limit, then replacement should be made.
2. Fuel injection timing incorrect	Adjust according to the recommended procedure.
3. Valve clearance incorrect	Adjust according to the recommended procedure.
4. Air filter choked	Clean it in clean fuel or kerosene.
5. Engine speed too low or too high	Adjust the speed — control lever knob to make the speed attain its rated value.
6. Pumping element (plunger and barrel) of the injection pump or injector nozzle worn-out or opening pressure of the injector incorrect	Replace them, or adjust the opening pressure of the injector to $12.75\text{MPa} \pm 0.5\text{MPa}$ or $13.5\text{MPa} \pm 0.5\text{MPa}$ (S195B) .

C. Engine Stalls

Cause	Remedy
1. Flow of fuel interrupted	Supply with sufficient quantity of fuel to the fuel tank. If there is air in the fuel pipe line or the fuel filter is choked, vent and remove all air and dirt.
2. Quantity of lubricating oil insufficient, or some parts burnt due to faults in lubrication system	Examine the quantity of oil by means of the dipstick, replenish if insufficient. Inspect the oil pump to see if it works normally and check all oil ducts . Find out the troubles and remedy them. Replace the burnt part with new one if any exists.
3. Sticking of the needle valve with the nozzle body of the injector	If no “chattering” is heard from the injector while turning the starting shaft of the engine, it will often indicate that the needle valve is stuck or seized. In that case, clean it in clean fuel and lap it a little with the nozzle body. Replace it if necessary
4. When the load increased, speed system blocked	Find out the reason of block and remedy them
5. Valve spring or injection pump spring broken	Replace a new one

D. Engine Exhausts Dense Black Smoke

Cause	Remedy
1. Engine overloaded	Reduce the load appropriately. If the belting or coupling with the driven machine is not right, correct it.
2. Faulty injector	Check the opening pressure of the injector and the atomization of the fuel spray. Correct it if necessary, or replace it if worn
3. Incomplete combustion	This results mainly from faulty injector, incorrect fuel injection timing, leakage through the cylinder head gasket and from insufficient compression, etc. Remedy whatever the real cause may be.
4. Connecting rod bearing shells burnt, or sticking of the bearing shells with crankshaft	Replace the connecting bearing shells ,or repair the crankshaft.

E. Other Defects

(If any of the following conditions arises, it is necessary to stop the engine immediately)

Cause	Remedy
1. Engine speed “hunting”	Check the sensitivity of the governor system, and vent the fuel supply line if there is any air in it.
2. Abnormal engine noise suddenly arises	Make a careful check for every moving part.
3. Engine suddenly exhausts black smoke	Proceed according to the part “D”.
4. Red float in the oil indicator suddenly drops down	Examine the lubrication system to see if the oil strainer screen and other oil duct are choked and to observe whether the oil pump operates normally.

Section VI. Dismounting and Reassembly of the Engine

If it is necessary to dismount the engine for maintenance and repair, it is recommended to proceed in the following order:

- A. Draining out the cooling water by opening the drain cock.
- B. Removing the cylinder head cover and the cylinder head.
 1. Turn off the pipe connection bolt from the inlet of the oil indicator and the Fixing-nuts on the cylinder head cover. Then the cylinder head cover may be removed.
 2. Close the fuel cock under the fuel tank, and then disconnect the fuel — leak — off connecting pipe of the injector from the fuel filter.
 3. Screw off the bolts which connect the air filter with the intake pipe. And remove the air filter and intake pipe.
 4. Screw off the two bolts which connect the exhaust silencer with the cylinder head and remove the silencer as a whole .
 5. Turn off the two nuts which hold down the rocker — arm shaft support on the cylinder head, remove the support and draw out the two valve push rods.
 6. Remove the high pressure fuel pipe.

While reinstalling the high pressure fuel pipe, it is necessary to turn but not to tighten the connecting nuts on both ends of the pipe simultaneously, and first tighten the one which connects the pipe with the injection pump. Operate the pump with the fuel priming handle until fuel flows out of the other end of the pipe which is connected with the injector. Then tighten the nut on this end.
 7. Screw off the nuts holding down the injector clamping plate, then remove the injector and the clamping plate.

While reinstalling the injector, the sealing copper washer should be slipped on the nozzle before it is put back into its place. The two nuts are to be tightened evenly.
 8. Turn off the cylinder head nuts, and remove the cylinder head. While reinstalling, the cylinder head nuts are to be tightened one by one in a diagonal order and with a final torque of about **270 N•m ~285N•m**.
 9. Remove the fuel cylinder head gasket. Pay attention to the right-side and back - side of it when remounting.

C. Removing the fuel tank and the hopper

1. Close the fuel cock in the fuel supply pipe.
2. Remove the lifting eye nut.
3. Disconnect the fuel supply pipe from the fuel filter.
4. Screw off two bolts located above the rear cover of the cylinder block, which fix the fuel tank on the block, and also screw off the two bolts connecting the fuel tank and the hopper together. Then remove the fuel tank.

5. Remove the funnel assembly from the hopper.
6. Screw off the four bolts inside the hopper, which fix the hopper on the cylinder block. Then take off the hopper and remove the hopper gasket.
7. Remove the upper cover of the cylinder block and its gasket.

D. Dismounting the gear casing

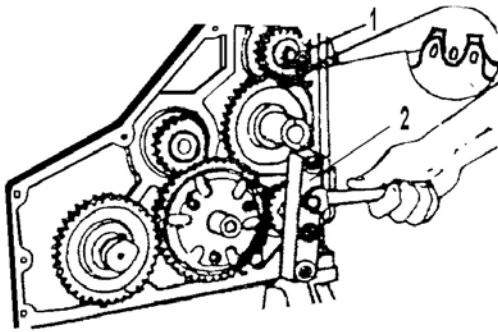


Fig. 1 Arrangement of gear train
(tooth- mesh- makes must be lined up)
and dismantling of balancing shaft gear
by means of a puller

1. Fixing bolt
2. Puller

1. Screw off the bolts which fix the gear casing to the cylinder block, and take off the gear casing .

2. Draw out the camshaft along with its gear, and take of the starting gear along with its shaft.

3. Dismantle the speed -governor gear, sliding ball -race and steel balls.

While assembling, it is absolutely necessary that marks on all the gears must be respectively lined up with one another as they were before dismantling (Fig1) .

E. Removing the rear cover of the cylinder block.

1. Take out the oil dipstick.
2. Screw off the bolts which fit the rear cover on the cylinder block, then remove the rear cover and its packing.

F. Dismantling and reinstalling the piston — connecting rod assembly

1. Turn the flywheel until the big end of the connecting rod is in the position nearest to the rear opening of the cylinder block, in order to facilitate the removing of the connecting rod bolts.
2. Cut off by means of a pear of pliers the steel wire which locks connecting rod bolt and remove it. While re-installing, new wires should be used and twisted tightly.
3. Unscrew the connecting rod bolts by means of the special wrench supplied with the engine.
4. Take off the connecting rod cap.

Caution: The connecting rod bearing shells must be well protected while taking off the cap.

5. Turn the flywheel slowly until the piston is at the top dead center position (Any carbon deposit on the wall of the cylinder liner should be pre-moved). Then push slowly the piston —

connecting rod assembly out of the cylinder bore by means of a wooden rod against the big end of the connecting rod through the rear opening of the cylinder block.

Caution: Be careful of this operation not to damage the crankpin, the cylinder liner and the piston

While reinstalling, the 45° parting surface of the big end of the connecting rod must be kept downwards, the cap must be fitted on in such a way that the matching marks on both the cap and the rod should be on the same side. The piston rings are to be so fitted on to the piston that the gaps are spaced 120° apart from one another. and the ends of the second and third compression rings on which there is a mark “T” are kept upwards (to wards the cylinder head). The connecting rod bolts are tightened with a torque of about 88 N•m ~110N•m. but before being completely tightened, it is necessary to turn the flywheel to see if the moving parts move freely, and then tighten the bolts evenly and completely. Further more, while re-installing, the crankpin, the connecting rod bearing shells, the piston and the piston rings are all to be smeared with a little clean lubricating oil. If it is necessary to replace the small end bushing of the connecting rod, then after replacement, the connecting rod should be so assembled back with the piston as it was before.

G. Dismantling the flywheel

1. Remove the pulley.
2. Unlock the lock washer of the flywheel nut.
3. Loosen the flywheel nut by means of a special wrench (knock the handle of the wrench with a hammer counter — clockwise, if necessary.), but do not screw it off (Fig. 2)

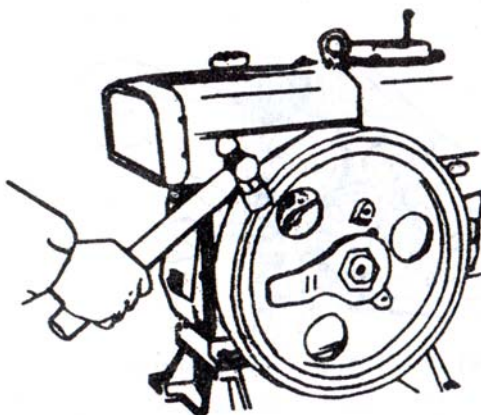


Fig. 2 Loosening the flywheel nut by knocking the handle of the wrench with a hammer.

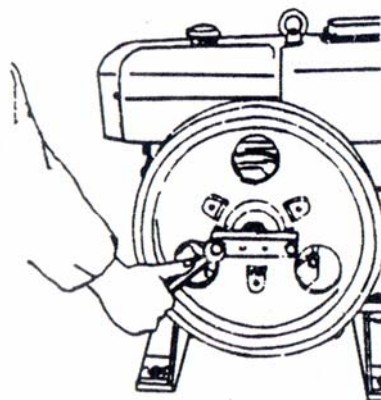


Fig. 3 Removing the flywheel by means of the puller

4. Pull -out the flywheel by means of the puller. A hammer may be used to knock the center of the bridge of the puller if the flywheel is difficult to pull out (Fig. 3, Fig. 4).

5. Screw off the flywheel nut and take off the flywheel. Be careful not to damage the thread on the end of the crankshaft while taking off the flywheel, and do it with safety since the flywheel is heavy.

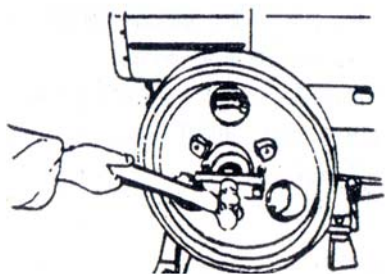


Fig. 4 Knocking the center of the bridge of the puller by means of a hammer.

6. Remove the flat key from the crankshaft by means of a M6 cap screw.

H. Removing and reassembling the crankshaft

1. Take off the oil pipe, which connects the main bearing housing with the oil indicator by screwing off the pipe connection from the housing..
2. Remove all the fixing bolts of the main bearing housing.

3. Pull out the main bearing by screwing the two M8 bolts simultaneously and slowly into the two holes which are diagonally spaced on the housing until it is pulled out. During this operation, be careful to keep the crankshaft from moving out. Put it back if it does. Otherwise, the crankshaft may drop down and get damaged.

A wooden hammer may be used to knock the timing gear side of the crankshaft and carefully take the crankshaft out of the cylinder block.

4. Carefully take the crankshaft out of the cylinder block.

Caution: during this operation, all the journals of the crankshaft should be protected from being scratched or damaged. While reassembling, they must be smeared with a layer of clean lubricating oil.

I. Removing and reassembling the balancing shafts

Under ordinary conditions, it is not recommended to remove the balancing shafts. But if the ball bearings are worn and need to be replaced, they may be removed and reassembled according to the following procedure:

1. Take off the bearing cover of the upper balancing shaft on the flywheel side of the engine, and remove the lubricating oil pump from the lower balancing shaft on the same side.
2. Screw off the bolts on the gear end of both the balancing shafts and remove the gears by means of the puller.
3. Remove the circlips from the block.
4. Tap both the balance shafts from the flywheel side of the engine by means of a wooden hammer or a copper rod, until the ball bearings on the other end of the shafts come out of the cylinder block, and then remove the ball bearing.
5. Similarly, push the balancing shafts towards the flywheel side and remove the ball bearings on this end of the shafts.

6. After removing the ball bearing, carefully take out the balancing shafts from the cylinder block.

Section VII. Fitting Clearances and Wear limits of the Main moving Parts

No	Fitting parts	Kind of fitting	Standard Clearance mm	Limits of wear mm
1	Main journal of crankshaft with main bearing	Clearance	0.08~0.12	0.25
2	Crankpin of crankshaft with connecting rod bearing	Clearance	0.06~0.1.08	0.25
3	Piston pin with connecting rod small end bushing	Clearance	0.020~0.056	0.12
4	Piston skirt with cylinder liner	Clearance	0.16~0.225	0.42
5	Open gap of the first piston compression ring		0.30~0.50	2
6	Open gap of the second piston compression ring		0.25~0.45	2
7	Open gap of oil scraper ring		0.25~0.40	2
8	Valve stem with guide bushing	Clearance	0.05~0.10	0.30
9	Rocker arm shaft with its bushing	Clearance	0.016~0.052	0.20
10	Camshaft with its front bushing	Clearance	0.035~0.089	0.25
11	Camshaft with its rear bushing	Clearance	0.03~0.093	0.25
12	Speed-governing gear shaft with its bushing	Clearance	0.02~0.066	0.25
13	Starting shaft with its bushing (A)	Clearance	0.04~0.088	0.25
14	Starting shaft with its bushing (B)	Clearance	0.04~0.12	0.25
15	Axial clearance of crankshaft	Clearance	0.15~0.28	adjust with shims

Section VIII. Maintenance of the Engine

Item	Maintenance	Period
1. Cooling water	As soon as the red ball of the float in the hopper goes down near the mouth of the funnel, replenish water	As required
2. Lubricating oil	As soon as the oil level in the sump drops down near the lower marked line on the dipstick, replenish oil.	Everyday
	After the first 50 hours of operation of a new engine, it is necessary to clean the crankcase and the oil sump once, and renew the oil.	First 50 hours
	Hereafter, the oil must be changed for every 100 hours of operation	100 hours
3. Lubricating oil strainer	After the first 50 hours of operation of a new engine, it is necessary to dismantle the strainer and clean it.	First 50 hours
	Hereafter, the strainer must be cleaned for every 100 hours of operation.	100 hours
4. Air filter	Ordinarily, the filter is to be cleaned and the oil inside is to be changed one every 100 hours of engine operation, when the environment air condition is comparatively clean.	100 hours
	But when the engine is used to power a walking tractor, the cleaning of the filter and the change of oil are to be done every 50 hours of operation.	50 hours
	In case the engine is operating in a dusty atmosphere, it is necessary to clean the filter and change the oil inside every shift of work.	Every shift
5. Fuel filter element	Clean the paper element of the filter with clean fuel or kerosene and blow it from inside out, Replace it if element is broken out.	100 hours
6. Cylinder head nut	Retighten cylinder head nuts with a torque of $270 \text{ N}\cdot\text{m}$ $\sim 285 \text{ N}\cdot\text{m}$, After the first 30 hours of a new engine,	First 30 hours

Item	Maintenance	Period
7. Fuel tank and filling screen	Remove the screen from the inlet of the fuel tank and clean it in clean fuel. Clean the inside of the fuel tank with clean fuel.	50 hours 500 hours
8. Lapping of valve	Smear the valve seats with a little bit of lapping paste and lap them together with the valves carefully (Caution: do not let the lapping paste get into the valve guides). After lapping , wash the valves and the valve seats with clean fuel and wipe them dry. Checking the valve for tightness may be done by pouring into the intake and exhaust ports a small quantity of fuel and observe whether they leak out around the valve seats.	500 hours
9. Valve clearance	Adjust according to the recommended procedure	100 hours
10. Cylinder head, Cylinder liner and Piston —connecting rod assembly	Remove carbon deposit if any, and clean them with clean fuel. It may not be necessary to dismantle them for cleaning if the engine operates normally.	1000 hours
11. Oil ducts in the crankshaft	Screw off the oil duct plug from the crankshaft. Clean the center hole of the crank pin and the two oil passages in the crankshaft with clean fuel.	200 hours
12. Cooling water passages	Pour into the water passages a solution of hydrochloric acid (HCL) of 25% concentration, keep it for about 10 minutes and then blow wash with fresh water. Repeat it again if not thoroughly cleaned. Note: the hopper must be removed from the engine before cleaning..	500 hours

Section IX. Preservation and Storage of the Engine

If the engine is to be put out of service for a comparatively long period of time, it is necessary to preserve it according to the following procedure, in order to prevent any corrosion.

1. Drain out the lubricating oil from the oil sump by screwing off the oil — drain plug. Screw back the plug after draining. This operation may better be performed immediately after the engine stops running when the oil temperature is comparatively high(Fig. 5).

2. Drain out completely the cooling water by opening the water — drain cock.

3. Drain out the fuel from the fuel tank.

4. Remove the rear cover of the cylinder block.

Take out the oil strainer, dismount and clean it.

5. Clean the crankcase, and then reinstall the oil strainer.

6. Clean the filtering element and the inside of the air filter.

7. Take 1.8 kg of filtered. #CC15W/30 oil and give it a dehydration treatment (Heat it to 100~150°C, until all bubbles on the surface of the oil disappear). Pour into the crankcase about 1 kg of this treated oil, and turn the engine. Until the red float in the oil indicator rises up, so as to make sure that the lubricating system is completely filled up with this oil.

8. Pour into the intake pipe about 0.3kg of this dehydrated oil, turn the engine to make sure that the piston, the cylinder liner and the valve seat are all covered with a layer of this oil. Then set the piston at its top dead center position in the compression stroke by turning the engine slowly, in order to isolate the inside of the cylinder from outside.

9. Add about 0.2kg of industrial vaseline to the remains of the dehydrated oil and heat it with agitation until the mixing is homogeneous.

10. Install all the parts that have been dismantled. Clean all the outside surfaces of the engine.

11. Wrap up properly the air filter, the exhaust pipe outlet and the funnel — mouth of the hopper with any kind of preservative paper in order to prevent any dust from getting in.

12. Smear with the above — mentioned mixture all the exposed surfaces of the engine which have not been painted (such as flywheel, oil pipe, etc.).

13. It is advisable not to smear the mixture on the surfaces of any parts made of rubber or plastics.

14. The engine so preserved should be stored in room of good ventilation and low humidity but without any dust. It is strictly forbidden to store the engine wherever there are chemicals (such as synthetic fertilizer, agricultural insecticide, etc.).

The preservation according to the above procedure may be good for six months. Over this period, repeat this procedure.

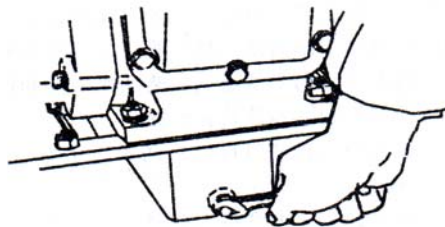


Fig.5

PART TWO PARTS LIST WITH ILLUSTRATIONS

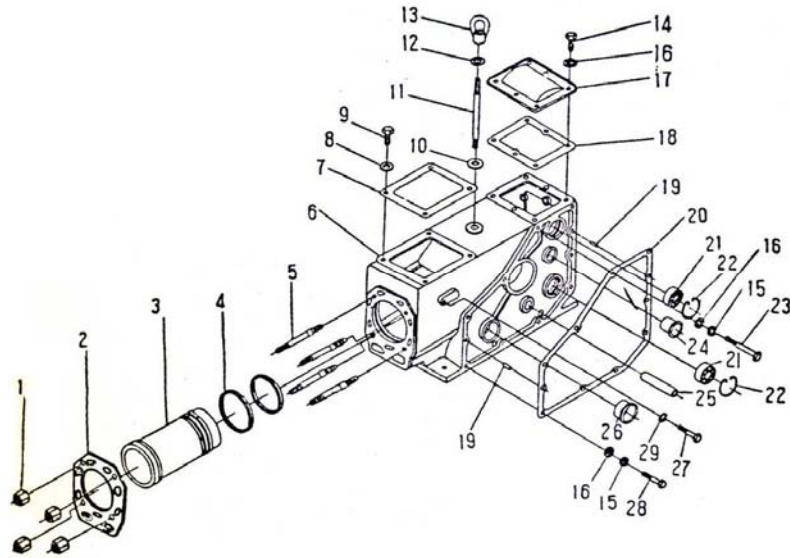


Fig.1 Cylinder Block assembly-1

Cylinder Block assembly-1(Fig .1)

No.	Name of Part	Part No.	Qty.	No.	Name of Part	Part No.	Qty.
1	Cylinder head nut	S195-01001	4	16	Washer 8-140HV	GB/T97.1	15
2	Cylinderhead gasket	S195-01002	1	17	Upper cover of the cylinder	S195-01011	1
3	Cylinder liner	S195-01003	1	18	Packing sheet of upper cover	S195-01012	1
4	Cylinder liner water seal ring	S195-01004	2	19	Locating pin A5×12	GBT119	1
5	Cylinder head stud	S195-01005	4	20	Gear casing packing	S195-01014	1
6	Cylinder block	S195-01006	1	21	Single row self-centering ball baring 6205	GB/T276	2
7	Hopper packing	S195-01007	1	22	Circlip	S195-01015	2
8	Washer 10-140HV	GB/T97.1	4	23	Hexagon bolt M8×95	GB/T5783	3
9	Hexagon bolt M10×25	GB/T5783	4	24	Starting shaft bushing (A)	S195-01016	1
10	Washer	S195-01008	1	25	Speed-governing gear shaft	S195-01017	1
11	Lifting stud	S195-01009	1	26	Camshaft front bushing	S195-01018	1
12	Washer 12-140-HV	GB/T97.1	1	27	Hexagon bolt M10×25	GB/T5783	1
13	Lifting eye -nut	S195-01010	1	28	Hexagon bolt M8×55	GB/T5783-	6
14	Hexagon bolt M8×18	GB/T5783	6	29	Spring Washer 10	GB/T93	1
15	Spring Washer	GB/T93	9				

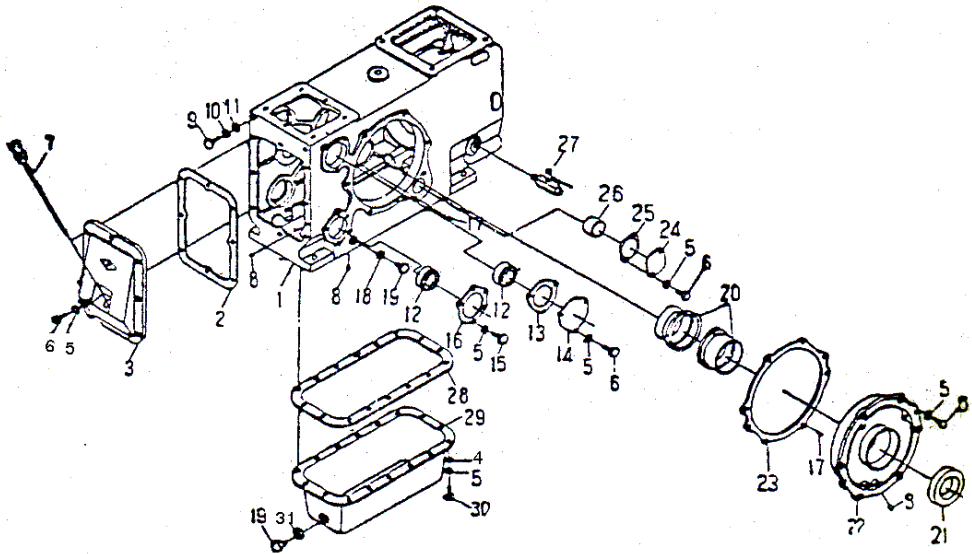


Fig .2 Cylinder Block assembly-2

Cylinder Block assembly-2(Fig .2)

No.	Name of Part	Part No.	Qty.	No.	Name of Part	Part No.	Qty.
1	Cylinder block	S195-01006	1	17	Locating pin A5×12	GB/T119	2
2	Packing of the rearcover	S195-01019	1	18	Washer	S195-01025	2
3	Rear cover	S195-01020	1	19	plug	S195-01026	2
4	Washer 8 –140HV	GB/T97.1	16	20	Main bearing	S195-01027	2
5	Spring washer 8	GB/T93	40	21	Oil seal for crankshaft	Φ 50× Φ 80×12	1
6	Hexagon bolt M8×25	GB/T5783	19	22	Main bearing housing	S195-01028	1
7	Oil dipstick	S195-01100	1	23	Main bearing housing mounting shim	S195-01029	as required
8	Oil hole plug on the	S195-01021	1	24	Camshaft cover	S195-01030	1
9	Hexagon bolt M10×20	GB/T5783	2	25	Packing for Camshaft cover	S195-01031	1
10	Spring washer 10	GB/T93	2	26	Camshaft rear bushing	S195-01032	1
11	Washer 10 –140HV	GB/T97.1	2	27	Water drain cock	S195-01300	1
12	Single row self centering ball bearing 6205	GB/T276	2	28	Packing for oil sump	S195-01033	1
13	Packing for balancing	S195-01022	3	29	Oil sump	S195-01200	1
14	Balancing shaft cover	S195-01023	1	30	Hexagon bolt M8×18	GB/T5783	16
15	Hexagon bolt M8×40	GB/T5783	3	31	O Type seal ring 16×2.4	GB/T1235	1
16	packing for lubricating oil pump	S195-01024	15				

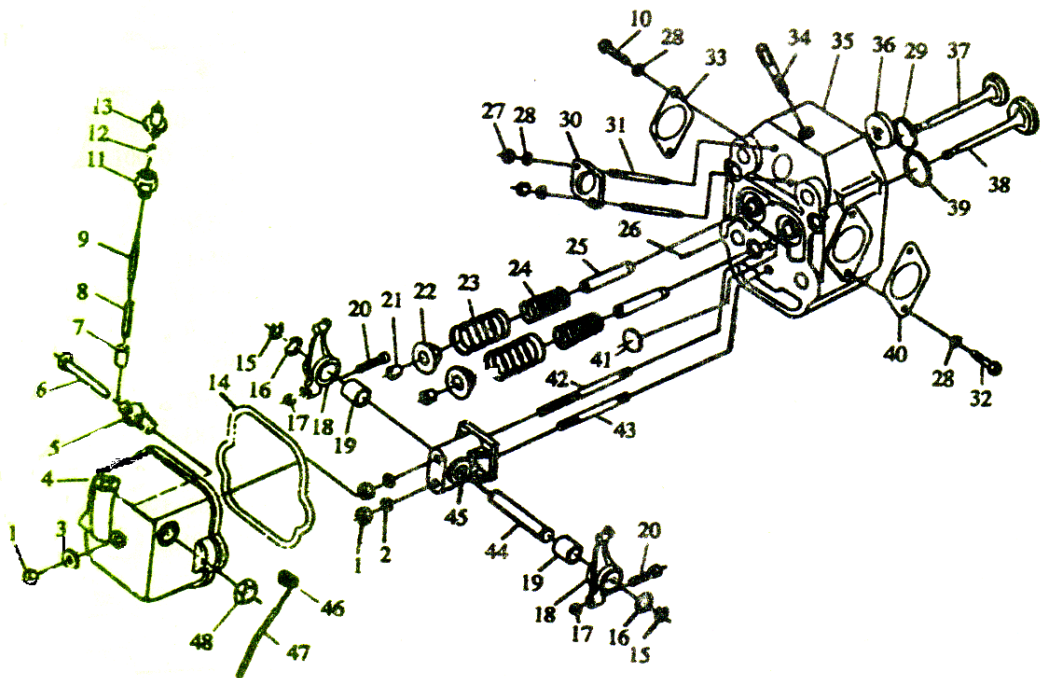


Fig .3 Cylinder Head assembly

Cylinder Head assembly(Fig .3)

Illus NO.	Name of part	Part NO.	Qty.
1	Hexagon nut M10	GB/T6170	3
2	Spring washer 10	GB/T93.	2
3	Washer 10-140HV	GB/T97.1	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 M8×28	GB/T5783	2
11	Oil indicator union	S195—03115	1
12	Red float of oil indication	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 AM8×1	GB/T6171	2

Illus NO.	Name of part	Part NO.	Qty.
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
23	Outer valve spring	S195—03009	2
24	Inner valve spring	S195—03010	2
25	Valve guide	S195—03010	2
26	Locating pin	GB/T119	1
27	Hexagon nut AM8	GB/T6170	2
28	Spring washer 8	GB/T93	5
29	Exhaust valve seat	S195—03028	1
30	Clamping plate for injector	S195-03013	1
31	Stud for injector clamping plate	S195—03014	2
32	Hexagon bolt M8×30	GB/T5783	2
33	Exhaust pipe packing	S195—03015	1
34	Starting —aid plug	S195—03016	1
35	Cylinder head	S195—03017	1
36	Turbulance combustion chamber insert	S195—03018	1
37	Exhaust valve	S195—03019	1
38	Intake valve	S195—03020	1
39	Intake valve seat	S195—03021	1
40	Intake pipe packing	S195—03022	1
41	Plug	S195—03023	3
42	Long stud for rocker arm shaft support	S195—03024	1
43	Short stud for rocker arm shaft support	S195—03025	1
44	Rocker arm shaft	S195—03026	1
45	Rocker arm shaft support	S195—03027	1
46	Decompression lever spring	S195—03104	1
47	Decompression lever	S195—03105	1
48	Set nut	S195—03106	1

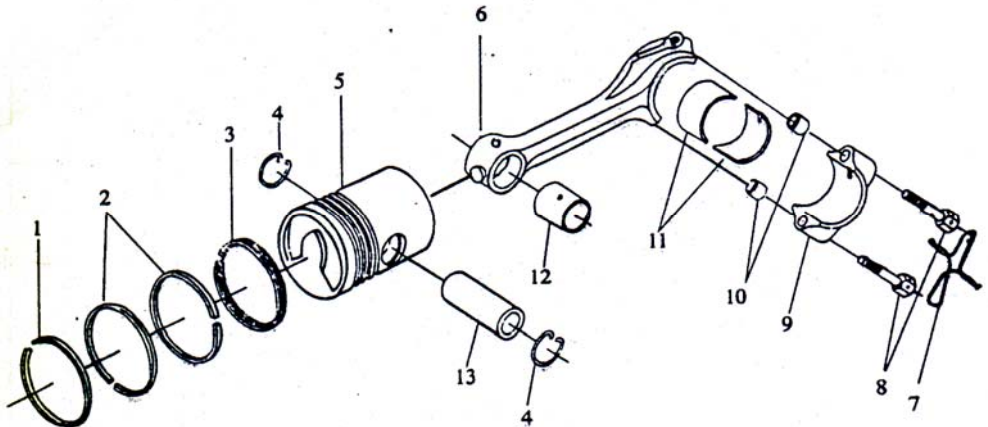


Fig. 4 Piston and Connecting Rod Assembly

Piston and Connecting Rod Assembly (Fig. 4)

III us NO.	Name of part	Part NO.	Quantity
1	Compression ring(1)	S195—04001	1
2	Compression ring(2)	S195—04002	2
3	Oil scraper ring	S195—04100	1
4	Criclip for piston pin	S195—04004	2
5	Piston	S195—04005	1
6	Connecting rod	S195—04006	1
7	Locking wire	Galvanized wire $\phi 1.8 \times 170$	2
8	Connecting rod bolt	S195—04008	2
9	Connecting rod cap	S195—04009	1
10	Guide	S195—04011	2
11	Connecting rod bearing shell	S195—04010	1set
12	Connecting rod bushing	S195—04012	1
13	Piston pin	S195—04013	1

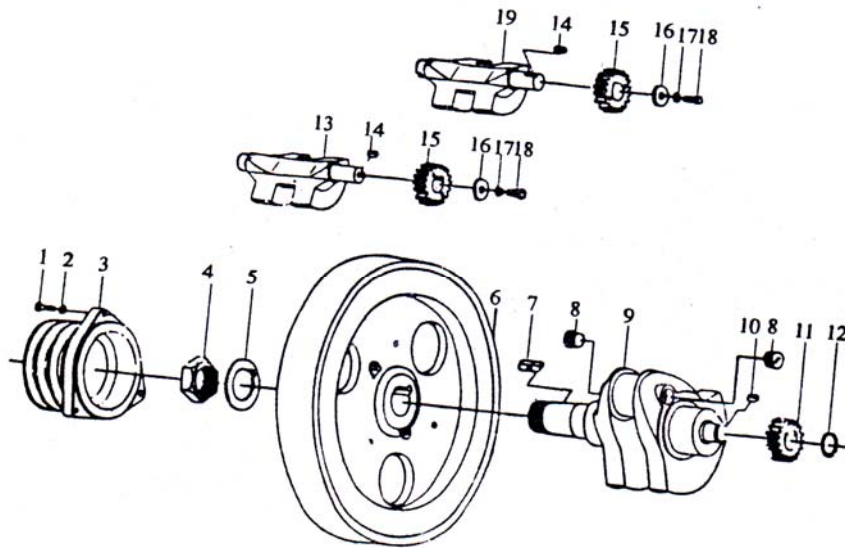


Fig. 5 Piston and Connecting Rod Assembly

Flywheel, Crankshaft and Balancing Mechanism (Fig.5)

Illus NO.	Name of part	Part NO.	Quantity
1	Hexagon bolt M10×35	GB/T5782	3
2	Spring washer 10	GB/T93	3
3	V — belt pulley	S195—05001	1
4	Flywheel nut	S195—05002	1
5	Lock washer	S195—05003	1
6	Flywheel	S195—05004	1
7	Flat key 12×14	GB/T1096	1
8	Crankshaft screw plug	S195—05007	2
9	Crankshaft	S195—05006	1
10	Flat key 8×6	GB/T1096	1
11	Crankshaft timing gear	S195—05009	11
12	Circlip 30	GB/T894.1	1
13	Upper balancing gear	S195—05010	1
14	Flat key C6×16	GB/T1096	2
15	Balancing shaft gear	S195—05012	2
16	Washer	S195—05013	2
17	Spring washer 8	GB/T93	2
18	Hexagon bolt M8×18	GB/T5783	2
19	Lower balancing shaft	S195—05014	1

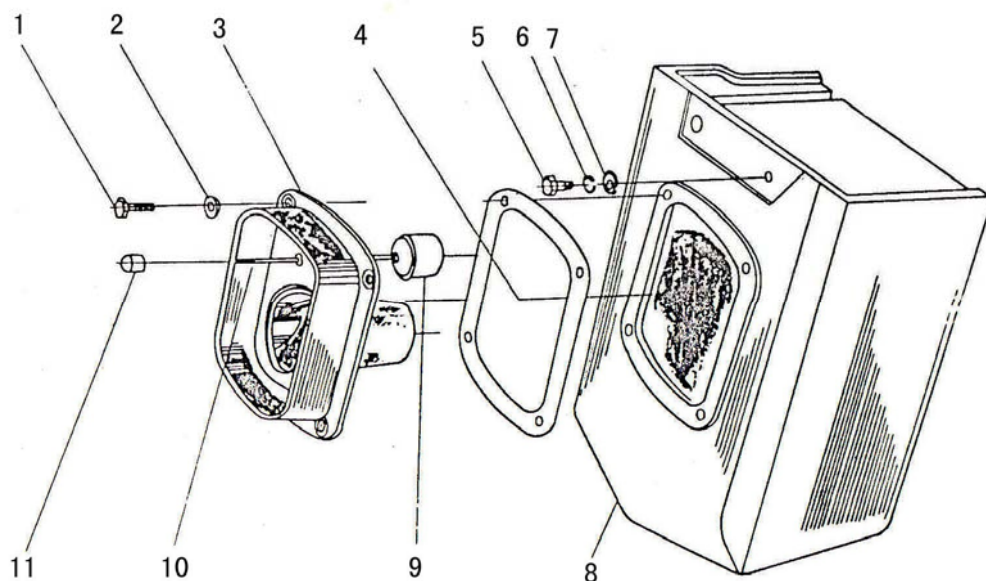


Fig. 6 Water Hopper Assembly

Water Hopper Assembly (Fig. 6)

III us NO.	Name of part	Part NO.	Quantity
1	Hexagon bolt M8×22	GB/T5783	4
2	Washer 8—140HV	GB/T97.1	4
3	Funnel	S195—06103	1
4	Packing for funnel	S195—0001	1
5	Hexagon bolt M8×18	GB/T5783	1
6	Spring washer 8	GB/T93	1
7	Washer	S195—05013	1
8	Hopper	S195—06001	1
9	Float	S195—06203	1
10	Float stem	S1100—06101	1
11	Red indicating ball	S195—06202	1



III us NO.	Name of part	Part NO.	Quantity
1	Fuel filter cover	C0506B—0002	1
2	Washer	S195—1117009	4
3	Pipe connection bolt	S195—1117076	2
4	Holding nut	C0506A—0004A	1
5	Seal ring	495A—12016	1
6	Seal ring	C0506A—0005	1
7	Fuel filter holder	C0506A—0006	1
8	Rubber ring	C0506A—0013	1
9	Washer	C0506A—0015	1
10	Spring	C0506A—0016	1
11	Fuel filter body	C0506A—3000	1
12	Seal ring	C0506A—0003.	1

Illus NO.	Name of part	Part NO.	Quantity
13	Fuel filter element	C0506A—1000	1
14	Washer	C0506A—0001	1
15	Valve seat (screw)	C0506A—0011	1
16	Spring	C0506A—0010	1
17	Steel ball	C0506A—0009	1
18	One —way valve seat	C0506A—0008	1
19	Washer	S195—09001	2
20	Fuel return pipe	S195—07100	1
21	Pipe connecting bolt	S195—09002	1
22	Fuel tank	S195—07500	1
23	Packing	S195—07004	1
24	Fuel out pipe	S195—07005	1
25	Fuel cock	S195—07700	1
26	Fuel pipe assembly	S195—07900	1
27	Primary fuel filter	S195—07600	1
28	Fuel cock seat	S195—07006	1
29	Spring washer	GB/T93	3
30	Hexagon bolt M6×16	GB/T5783	3
31	Lamp clamp	S195—07009	1
32	Washer 5—140HV	GB/T97.1	4
33	Spring washer 5	GB/T93	4
34	Button head cap screw	GB/T67	4
35	Fuel tank cap	S195—07300	1
36	Fuel filter screw	S195—07400	1
37	Fuel pipe	S195—07800	1
38	High pressure fuel pipe and its accessories	S195—07200	1
39	Pipe clip	S195—07205	1

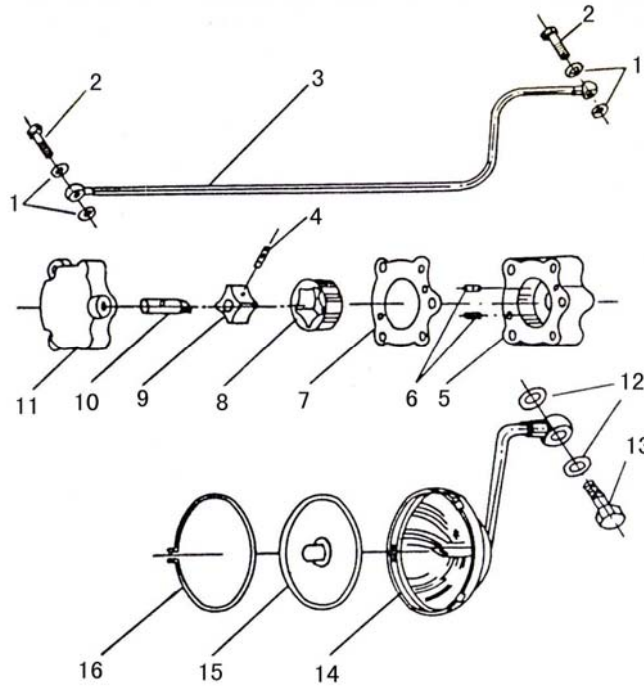


Fig . 8 Lubrication system

Lubrication system (Fig . 8)

Illus	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
6	Locating pin	GB/T119	2
7	Lubricating oil pump packing shim	S195—09203	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
12	Washer	S195—01025	2
13	Pipe connection bolt	S195—09003	1
14	Oil strainer body with suction pipe	S195—09310	1
15	Oil strainer screen	S195—09320	1
16	Circlip	S195—09301	1

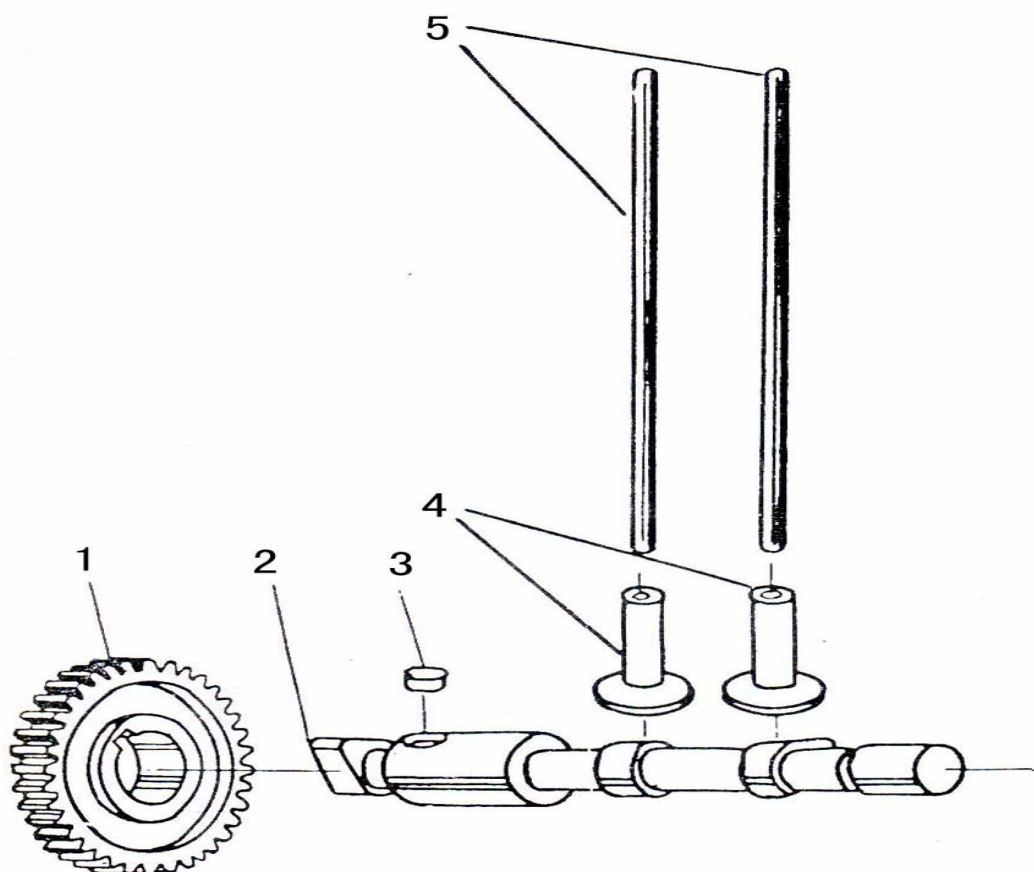


Fig. 9 Camshaft Assembly

Camshaft Assembly (Fig. 9)

Illus NO.	Name of part	Part NO.	Qty.
1	Camshaft gear	S195—02001	1
2	Camshaft	S195—02002	1
3	Flat key 10×16	GB/T1096	1
4	Valve tappet	S195—02004	2
5	S195	S195—02005	2

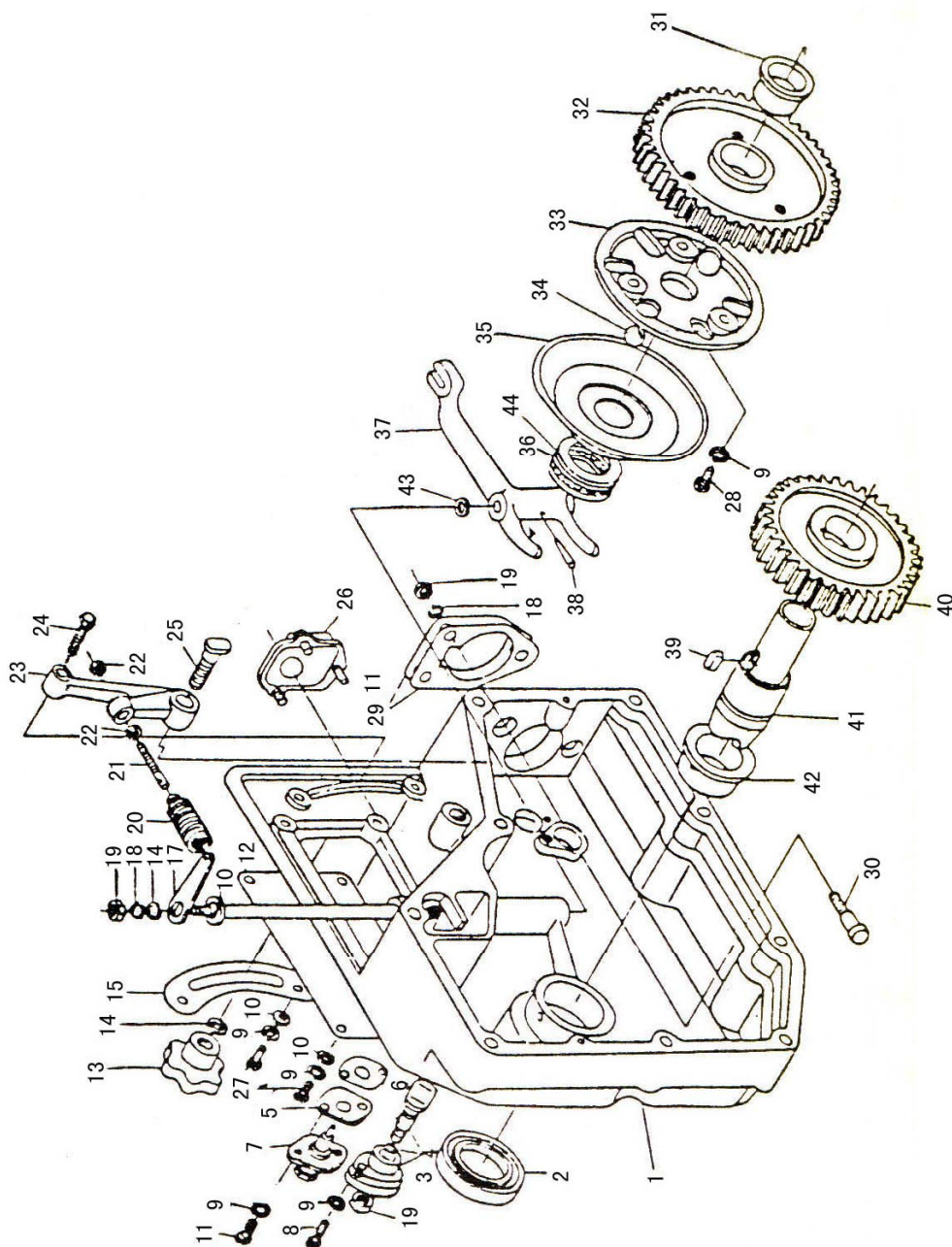


Fig 10 Gear Casing Assembly

Gear Casing Assembly(Fig 10)

Illus NO.	Name of part		Part NO.	Qty.
1	Gear casing		S195—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	Cover		S195—10003	1
6	Fuel limiter packing		S195—10004	1
7	Fuel limiter		S195—10600	1
8	Screw M6 $\times$ 20		GB/T67	1
9	Washer 6		GB/T93	8
10	Washer 6—140HV		GB/T97.1	9
11	Screw M6 $\times$ 16		GB/T67	2
12	Name plate		ZS195—10002	1
13	Speed control lever knob		S195—10200	1
14	Washer 8—140HV		GB/T97.1	2
15	Speed indicating panel	S195	S195—10005	1
		S195B	S1100B-10005	
16	Governor fork shaft		S195—10101	1
17	Governor arm		S195—10102	1
18	Washer 8		GB/T93	4
19	Hexagon nut M8		GB/T6170	4
20	Governor spring	S195	S195—10103	1
		S195B	ZS1110G-10138	1
21	Adjusting screw		S195—10104	1
22	Hexagon nut M6		GB/T6170	2

Gear Casing Assembly (Fig 10) —2

Illus NO.	Name of part	Part NO.	Qty.
23	Speed control lever	S195—10105	1
24	Hexagon bolt M8×40	GB/T5783	1
25	Speed control lever shaft	S195—10106	1
26	Crankshaft breather	S195—10500	1
27	Button head cap screw M6×12	GB/T67	6
28	Button head cap screw M6×18	GB/T67	6
29	Shim for fuel injection pump	S195—10007	As
30	Fuel injection pump mounting bolt	S195—10008	3
31	Governor gear bushing	S195—10107	1
32	Governor gear	S195—10108	1
33	Governor ball space	S195—10109	1
34	Steel ball 16	GB/T308	6
35	Governor ball race	S195—10120	1
36	Single direction thrust ball bearing 51106	GB/T301	1
37	Governor fork	ZS1110G—10121A	1
38	Taper pin 4×25	GB/T117	1
39	Flat key 8×6	GB/T1096	1
40	Starting gear	S195—10302	1
41	Starting gear shaft	S195—10303	1
42	Starting gear shaft bushing	S195—10010	1
43	Adjusting washer	S195—10113	As
44	Packing for governor ball race	S195—10031	As

Note: If the fuel limiter(No.7) is not provided, it will be replaced by a cover (No.7 : S195—

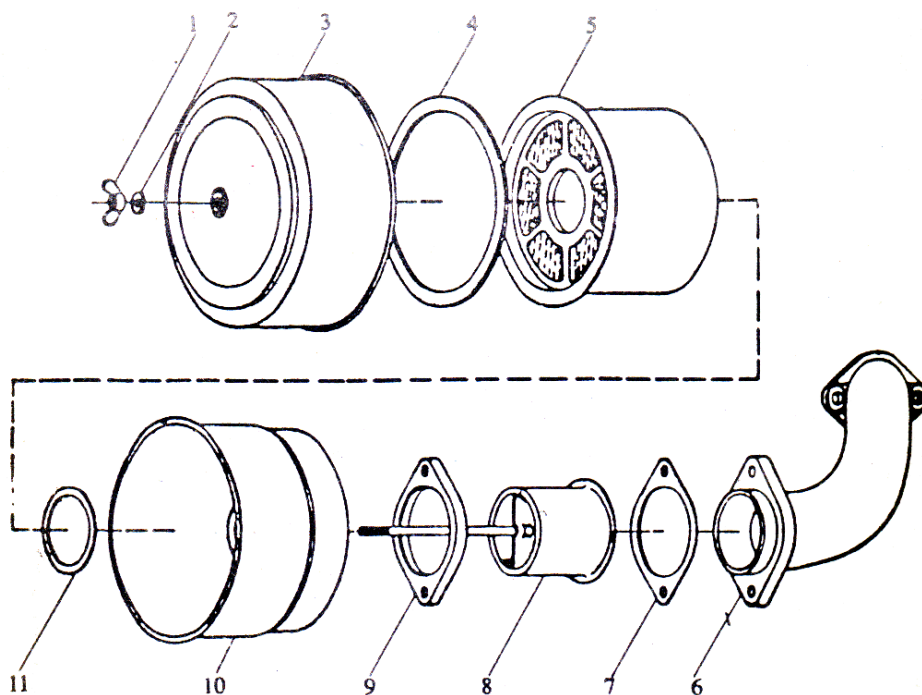


Fig.11 Intake System

Intake System (Fig.11)

Illus NO.	Name of part	Part NO.	Qty.
1	Wing nut AM6	GB/T62	1
2	Washer 6 — 140HV	GB/T97.1	1
3	Air filter cover	S195—11101	1
4	Rubber packing	S195—11102	1
5	Air filter element	S195—11110	1
6	Intake pipe and its accessories	S195—11102	1
7	Packing	S195—11103	1
8	Air filter sleeve	S195—11130	1
9	Air filter flange	S195—11105	1
10	Air filter body complete	S195—11120	1
11	Seal ring	S195—11104	1

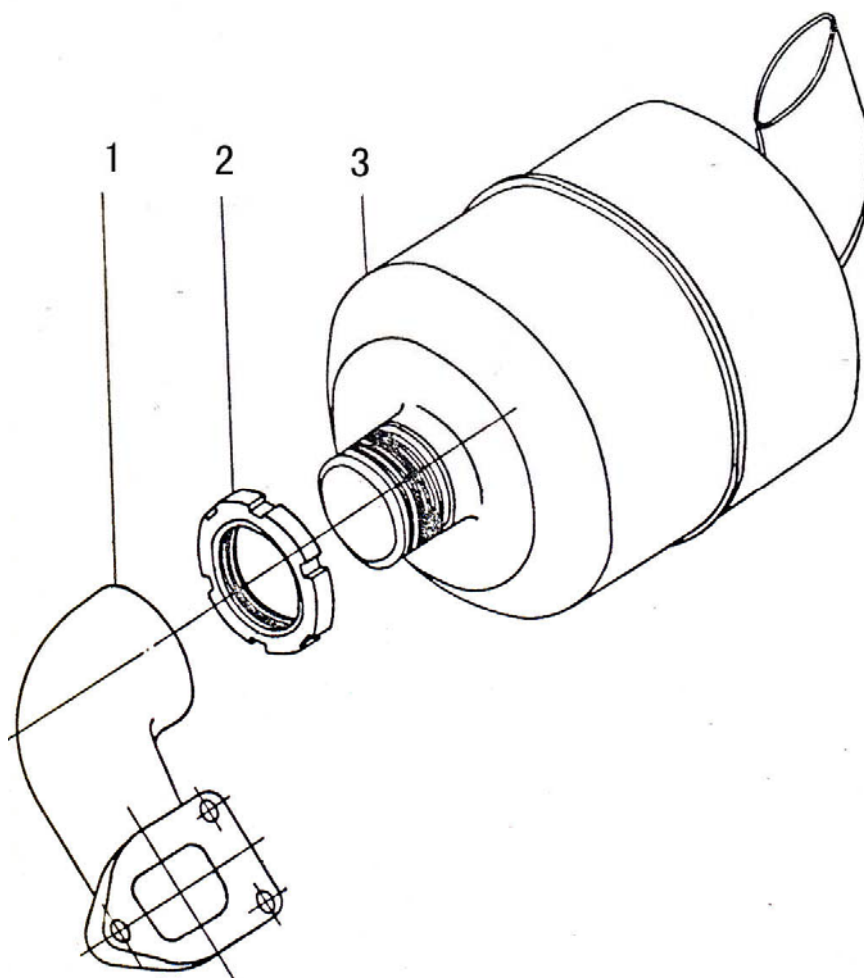


Fig.12 Exhaust System

Exhaust System (Fig.12)

Illus NO.	Name of part	Part NO.	Qty.
1	Exhaust pipe	S195—08002	1
2	Lock nut	S195—08001	1
3	Silencer	S195—08100	1

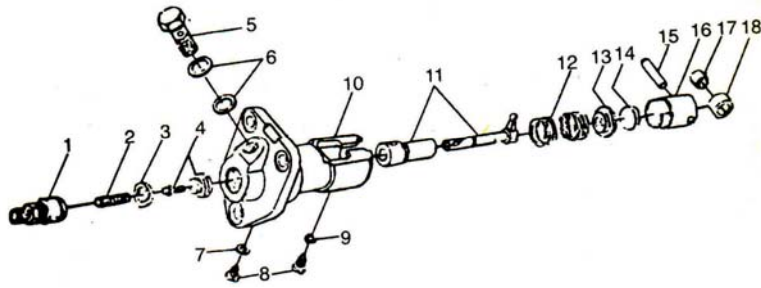


Fig 13 Fuel Injection Pump **P72-4**

Fuel Injection Pump (Fig 13)

Illus NO.	Name of part	Part NO.	Qty.
1	Delivery valve holder	T1—0001	1
2	Delivery valve spring	T1—0012	1
3	Delivery valve holder washer	T1—0011	1
4	Delivery valve with seat	F15—00	1
5	Fuel inlet pipe connecting screw	T1—0102	1
6	Sealing washer	12Q/WB401 —	2
7	Washer	6Q/WB401 —	1
8	Retaining screw	T1—0002	2
9	Spring washer 6	GB/T93	1
10	Pump body	T1—0001	1
11	Pump element (plunger and barrel)	U1—00	1
12	Plunger spring	T1—0002	1
13	Lower spring seat	T1—0004	1
14	Adjusting packing block	T1—0305	1
15	Roller pin	T1—0302	1
16	Tappet	T1—0391	1
17	Roller bushing	T1—0303	1
18	Roller	T1—0304	1

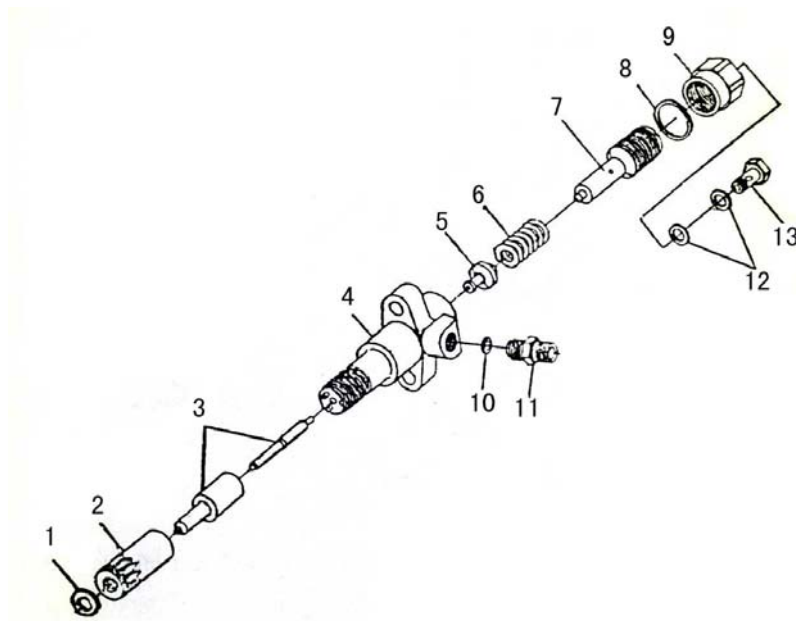


Fig. 15 fuel Injector **P21-10N**

fuel Injector (Fig. 14)

Illus NO.	Name of part	Part NO.	Qty.
1	Washer	P661 —010	1
2	Cap nut	P661 —009	1
3	Nozzle body (with needle valve)	ZS4S1	1
4	Nozzle holder	P662 —001	1
5	Steel ball	P661—0101	1
6	Needle valve spindle	P661—0102	1
7	Opening pressure adjusting spring	P661 —002	1
8	Washer	P661 —003	1
9	Opening pressure adjusting screw	P661 —004	1
10	Sealing washer	P661 —005	1
11	Lock nut	P661 —006	1
12	Sealing washer	P661 —007	2
13	Fuel leak —off connecting bolt	P661 —008	1

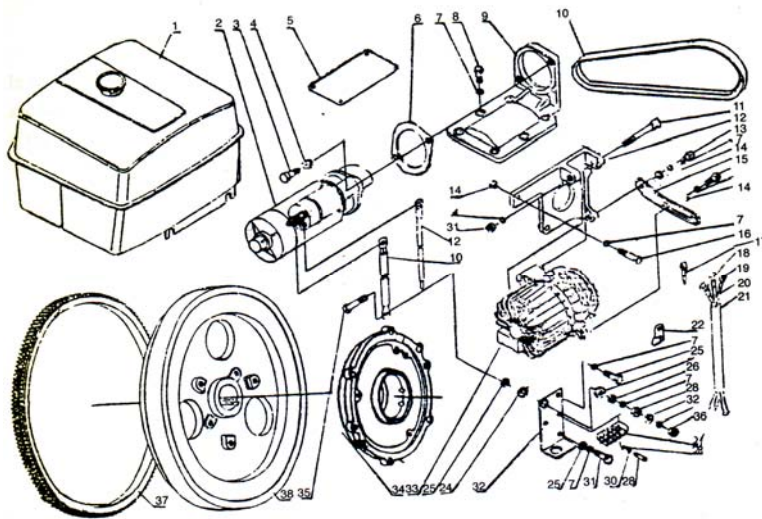


Fig. 15 Electrically started version (S195NM)

Electrically started version (S195NM) (Fig. 15)

Illus No.	Name of part	Part NO.	Qty.
1	Fuel tank	S195NM—07500	1
2	Starter	QD1202	1
3	Bolt M8×28	GB/T5783	2
4	Washer 10	GB/T93	3
5	Name plate	ZS195N(M)—10002	1
6	Starter packing	S195NM—01018	需要
7	Washer 8	GB/T93	15
8	Bolt M0×25	GB/T5783	6
9	Upper cover	S195NM—01011	1
10	V-belt B900	GB/T1171	1
11	Generator pin	S195NM—0	1
12	Generator support	S195NM—0	1
13	Bolt M0×20	GB/T5783	2
14	Washer 8	GB/T97.1	5
15	Generator supporting plate	S195NM—01036	1
16	Bolt M8×45	GB/T5783	3
17	Short plastic wire	S195NM—01300	1
18	Generator positive pole wire	S195NM—24230	1
19	Generator “F” pole wire	S195NM—2421	1
20	Generator negative pole wire	S195NM—24220	1

Illus No.	Name of part	Part NO.	Qty.
21	Soft plastic tube φ 11×1×200	HG2-536	1
22	Pipe clamp	S195NM—01040	1
23	Bolt M8×30	GB/T5783	1
24	Insulation Washer	S195NM—01041	2
25	washer 8 (T ₃)	GB/T97.1	4
26	Nut M8 (T ₃)	GB/T6170	2
27	Wiring rod	JX5—1005	1
28	washer 3	GB/T97.1	2
29	Screw M3×20	GB/T67	2
30	washer 3	GB/T93	2
31	Bolt M8×30 (T ₃)	GB/T5783	1
32	Wiring board	S195NM—01039	1
33	Integral Ac generator	JFZ1211	1
34	Main bearing housing	S195NM—01028	1
35	Bolt M8×45 (T ₃)	GB/T5783	1
36	Flywheel	S195NM—05004	1
37	Ring gear	S195NM—05001	1
38	Nut M8	GB/T6170	1
39	Wire of starter	S195NM—2450	1
40	Positive wire of starter	S195NM—24700	1

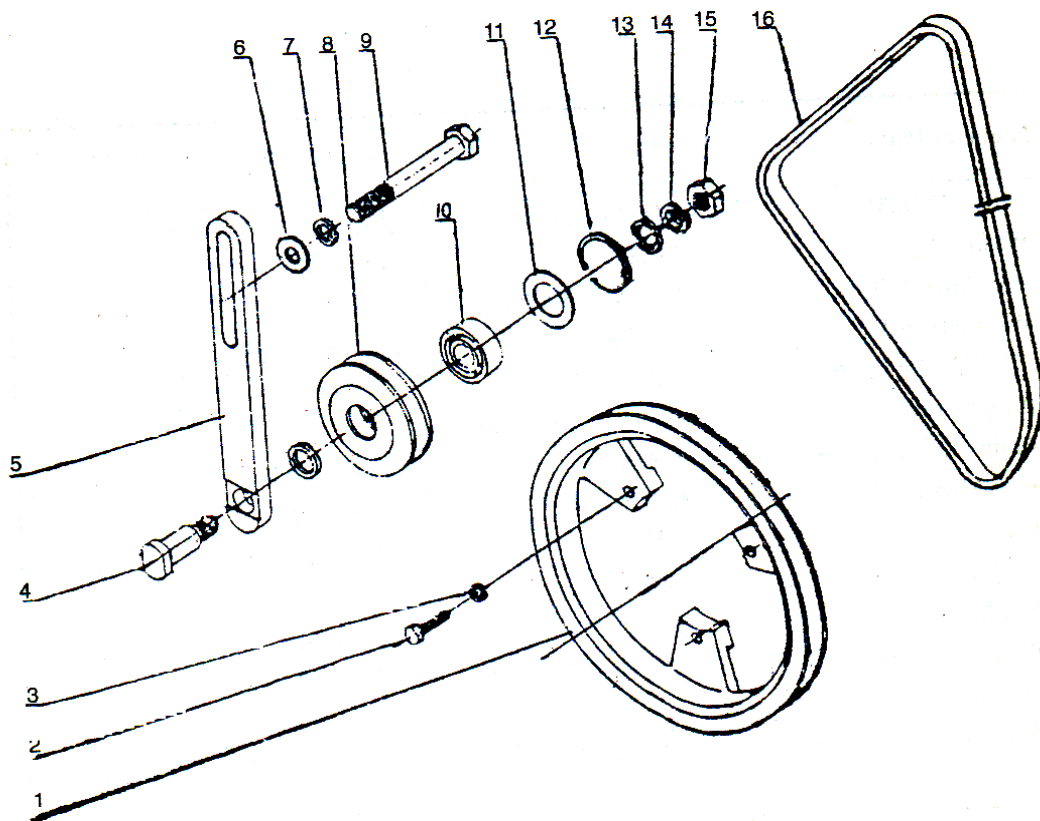


Fig.16: Transmission Assembly (S195N series)

Transmission Assembly (S195N series) -Fig.16

Illus No.	Name of part	Part NO.	Qty.	Illus No.	Name of part	Part NO.	Qty.
1	Big belt pulley	S195N—06105	1	9	Bolt M10×80	GB/T5783	1
2	Bolt M6×22	GB/T5783	3	10	Ball bearing 6202	GB/T276	1
3	Washer 6	GB/T93	3	11	Seal ring	S195N—06028	1
4	Tension pulley shaft	S195N—06004	1	12	Circlip 35	GB/T 893.1	1
5	Tension pulley bracket	S195N—06010	1	13	Ring	S195N—06029	2
6	Washer 10	GB/T97.1	1	14	Washer 12	GB/T93	1
7	Washer 10	GB/T93	1	15	Nut M12	GB/T6170	1
8	Tension pulley	S195N—06006	1	16	Fan belt 10×7×1120		1

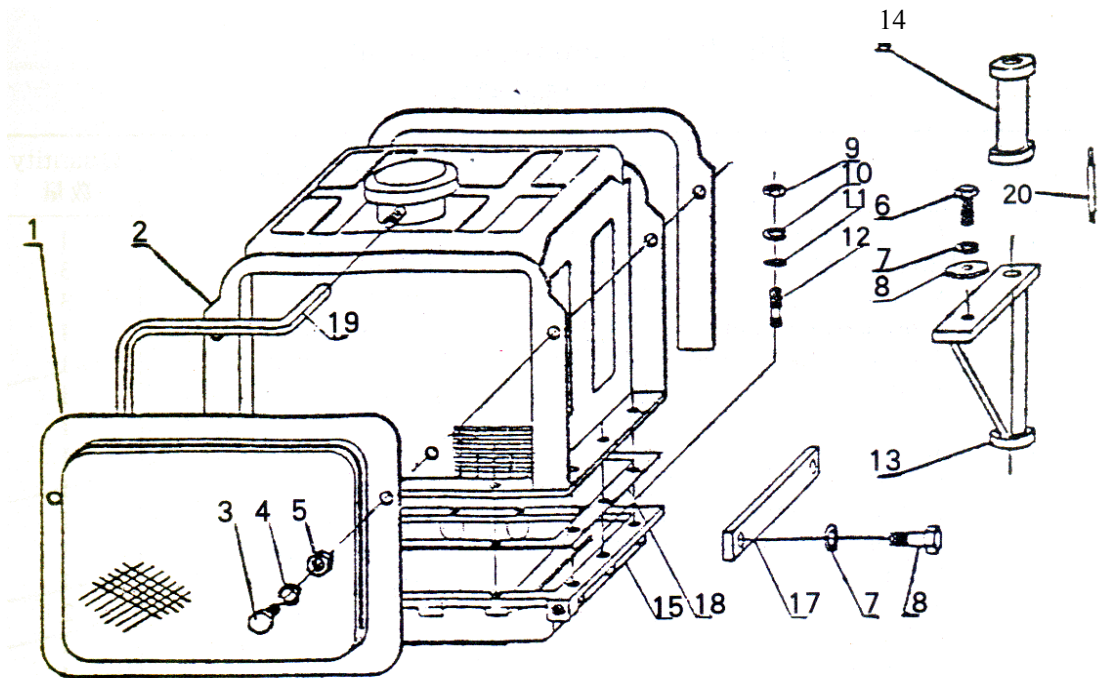


Fig.17 : Parts list of radiator cooling system (S195N series)

Parts list of radiator cooling system (S195N series) — Fig.17

Illus No.	Name of part	Part NO.	Qty.	Illus No.	Name of part	Part NO.	Qty.
1	shutter	S195N—06030	1	11	Washer 6—140HV	GB/T97.1	14
2	radiator system	S195N—06100	1	12	Stud M6×20	GB/T897	14
3	Bolt M8×20	GB/T5783	2	13	Fuel tank support (A)	S195N—06007	1
4	Washer 8	GB/T93	2	14	Fuel tank support (B)	S195N—06008	1
5	Nut M8	GB/T6170	2	15	Bottom tank	S195N—06001	1
6	Bolt M10×20	GB/T5783	1	16	Radiator packing	S195N—06011	1
7	Washer 10	GB/T93	3	17	Clamping late	S195N—06024	1
8	Clamping	S195N—05013	1	18	Bolt M10×80	GB/T5783	2
9	Nut M6	GB/T6170	14	19	Tube, plastic or rubber	φ 8×700	1
10	Washer 6	GB/T93	14	20	Lifting stud	S195N—01019	1

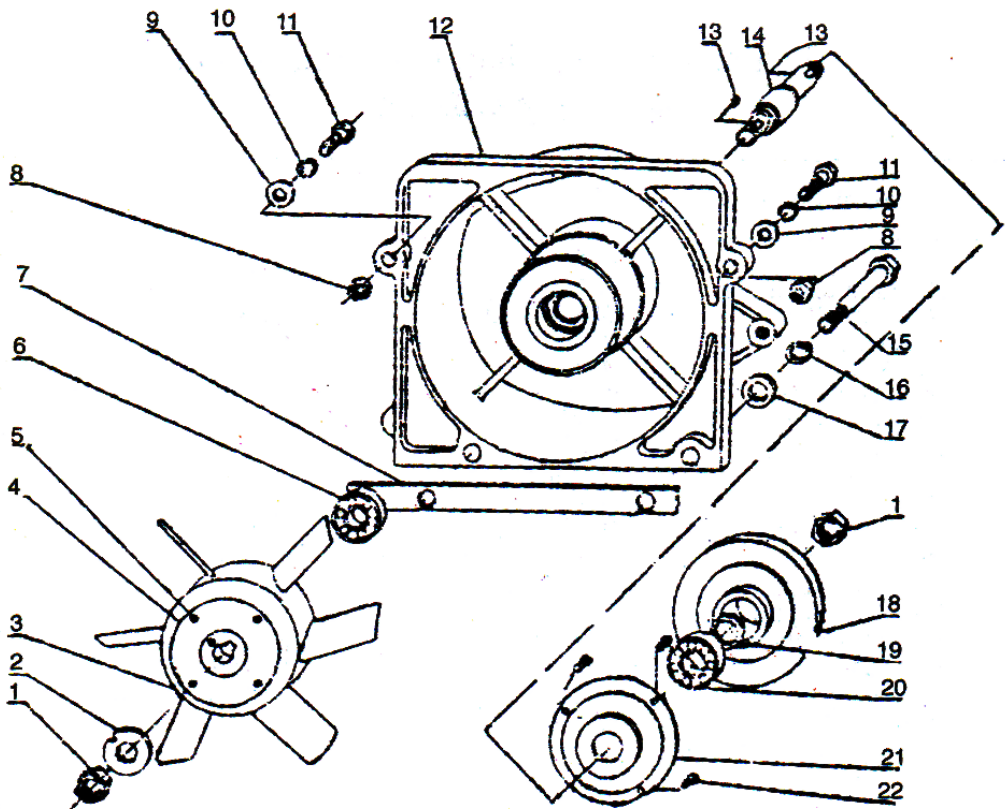


Fig.18 Fan assembly (S195N series)

Fan assembly (S195N series) -Fig.18

Illus No.	Name of part	Part NO.	Qty.
1	Nut M12×1.205	GB/T6173	2
2	Washer 12	GB/T856	1
3	Impeller	S195N—06202	1
4	Ring	S195N—06203	1
5	Rive 4×12	GB/T827	4
6	Ball bearing 6201	GB/T276	1
7	Packing	S195N—06035	1
8	Nut M8	GB/T6170	2
9	Washer 8	GB/T97.1	2
10	Washer 8	GB/T93	2
11	Stud M10×20	GB/T5783	2

Illus No.	Name of part	Part NO.	Qty.
12	Fan cover	S195N—06201	1
13	Key 5×12	GB/T1096	2
14	Fan shaft	S195N—06206	1
15	Bolt M10×60	GB/T5783	1
16	Washer 10	GB/T97.1	1
17	Washer 10	GB/T93	1
18	Small belt pulley	S195N—06209	1
19	Adjusting shim	S195N—06034	1
20	Ball bearing 60202	GB/T278	1
21	End cover	S195N—06208	1
22	Bolt M4×12	GB/T68	3

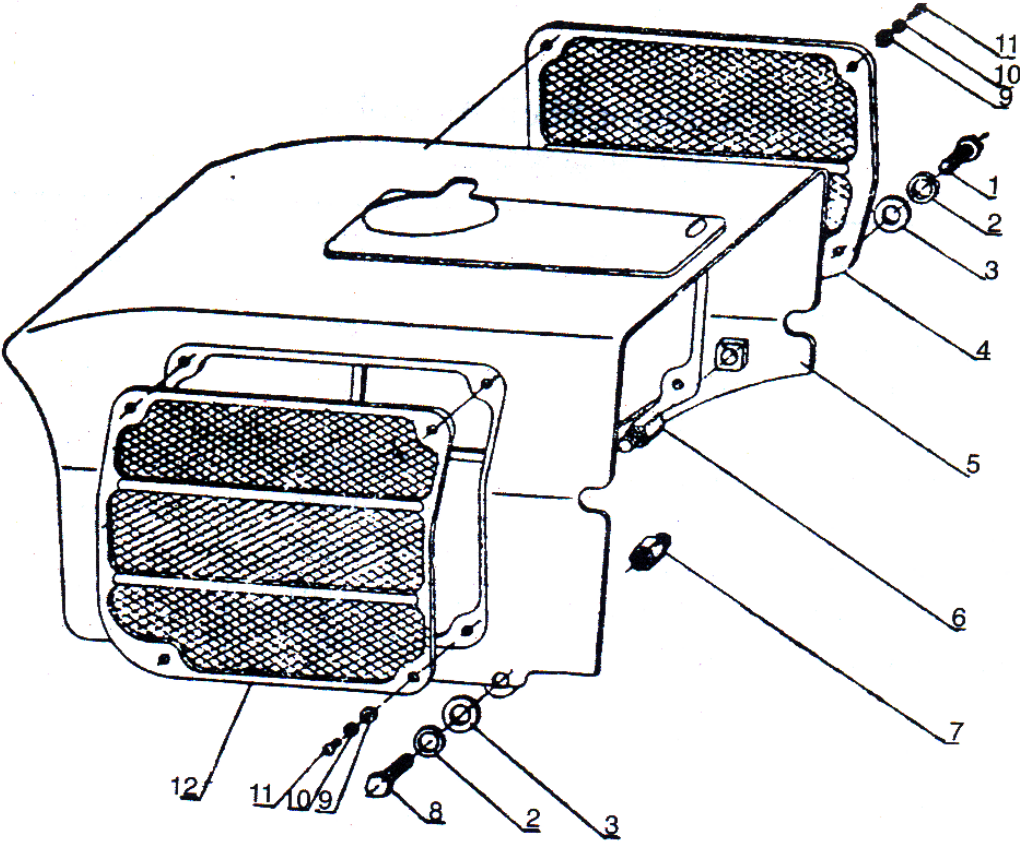


Fig. 19 Radiator shell Assembly (S195N series)

Radiator shell Assembly (S195N series) -Fig. 19

序号	名称	代号	数量	序号	名称	代号	数量
1	Bolt M10×60	GB/T5783	2	7	Connecting bolt (B)	S195N—06002	2
2	Washer 8	GB/T93	4	8	Bolt M8×16	GB/T5783	2
3	Washer 8	GB/T97.1	4	9	Washer 4	GB/T93	8
4	shutter (1)	S195N—06030	1	10	Washer 4	GB/T97.1	8
5	Radiator shell	S195N—06016	1	11	Stud M4×12	GB/T67	8
6	Connecting bolt (A)	S195N—06003	2	12	shutter (2)	S195N—06031	1

Appendix I List of Tools supplied with the Engine

Illus NO.	Name of part	Qty.
1	Hexagon wrench 60(special wrench for flywheel nut)	1
2	Hexagon wrench 27(special wrench for cylinder head nut)	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 bolt	1
8	Bridge of puller (for dismantling flywheel and balancing shaft gears)	1
9	Valve lapping tool, complete	1
10	Screw driver 6"	1
11	Lapping driver	1
12	Screw AM6×30 GB/T67(for remover flywheel key from crankshaft)	1
13	Bolt AM8×60 GB/T5782(for dismantling balancing shaft gears)	2
14	Bolt AM10×85GB/T5782(for dismantling flywheel)	2

Appendix II. List of spars parts supplied with the engine

Illus NO.	Name of part	Qty.
1	Cylinder head gasket	1
2	Piston ring	1set
3	Fuel filter element	1
4	Nozzle body (with needle valve)	1
5	Oil seal for crankshaft	1
6	Oil seal for starting shaft	1
7	Seal	1 bag
8	O type cylinder liner water seal ring	2

SUPPLEMENTARY INSTRUCTIONS FOR ZS195M DIESEL ENGINES

Electrically Starting Version

CONTENTS

Section I	Genera Description
Section II	Electrically started version and connection diagram
Section III	Operation of Electric Starting System
Section IV	Modified Parts List or Electrically Started Versions

Section I General Description

S195M, S195BM is modified version on the basis of S195 diesel engine, “M” standing for electric starting.

In the climate about -5 °C, S1100BM can be started rapidly without any measure. But for the convenience of customer, remains hand starting mechanism.

In this brochure, operation of electrically starting system and modified parts catalog are presented. So before operating, please read this supplementary instructions.

(If the electrically starting system is required, it can be ordered)

Section II. Electrically Started Version and Connection diagram

1. Electric starting system consists of Starter, Generator, Voltage Regulator, Battery and Circuit key switch.

1.1 Starter: QD1332 type starter with a rated capacity of 2.0kW and a voltage of 12V. The starter is of short rated operation design, with a battery as its power supply, and is fitted with a solenoid operated switch and an one way clutch. When it is connected to power supply, since the function of solenoid — operated switch, the pinion will be pushed out and engage with the ring gear on the flywheel, thus the engine will start running up. The clearance between the end surface of the starter pinion and the end surface of ring gear on the flywheel is 3.5~5mm, which can be adjusted by the use of insulating packing.

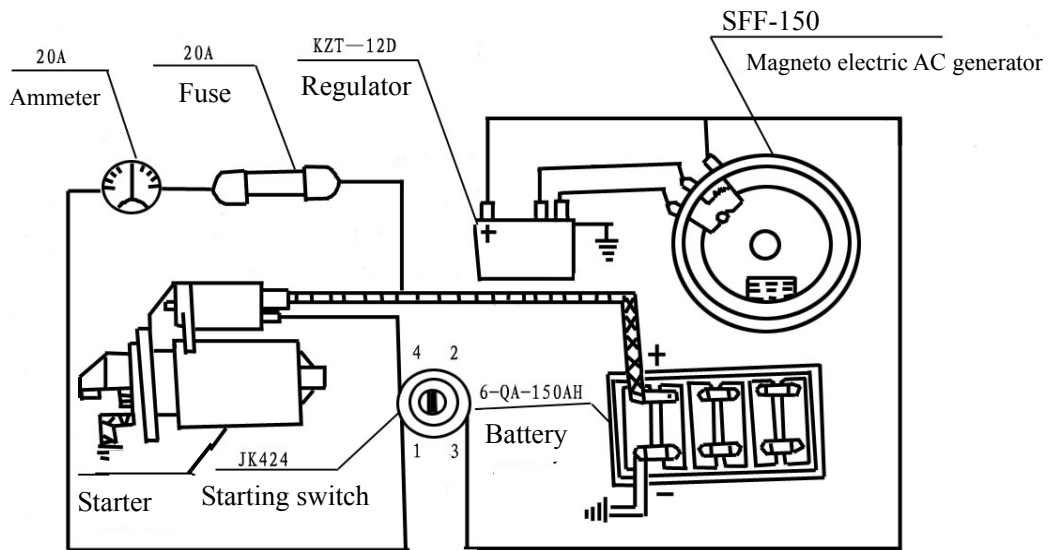
1.2 Generator: A SFF150 type flywheel generator is adopted for S195M engine, with a rated capacity of 150W, a voltage of 12V. Regulator KZT-12D type voltage regulator. It converts AC into DC for the charging of battery. The function of it is to limit the voltage at 14V.

1.3 A JFZ1211ZN type integral AC generator is adopted for s1100BNM engine, with a rated capacity of 200W, a voltage of 14V, a speed range of 1300~3500r/min. with silicon diode and electronic regulator(model JF 1401 or other type), it converts AC into DC for the charge of battery.

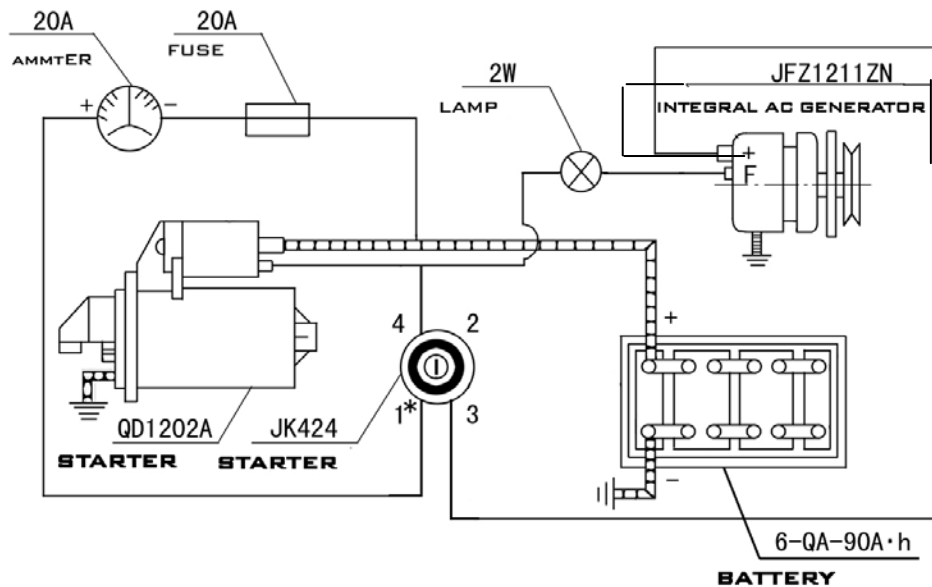
1.4 Battery: 6 — QA — 90AH type battery (self — provided) for starting use with a capacity of 150 Ah, a rated voltage of 12V.

1.5 Circuit key switch: JK 424 type ignition key switch with four positions:

- (1) Initial position “0”, (cut off the power).
- (2) Position “ I ”, (turn the key clockwise) .
- (3) Position “ II ” ,(continue to turn the key clockwise).
The key will turn back to position “ I ” automatically.
- (4) Position “ III ” , (turn the key anticlockwise from position “0”)



Connection Diagram of Electric Starting System of ZS195BM



Connection Diagram of Electric Starting System of ZS195NM

Section III. Operation of electric starting system

1. Check before operation

- (1) Check all the wiring connections for tightness.
- (2) Check to see if there is a clearance of 3.5~5mm between the two end surfaces of starter pinion and the ring gear.
- (3) Check to see if the key switch is at “0” position.

2. Starting

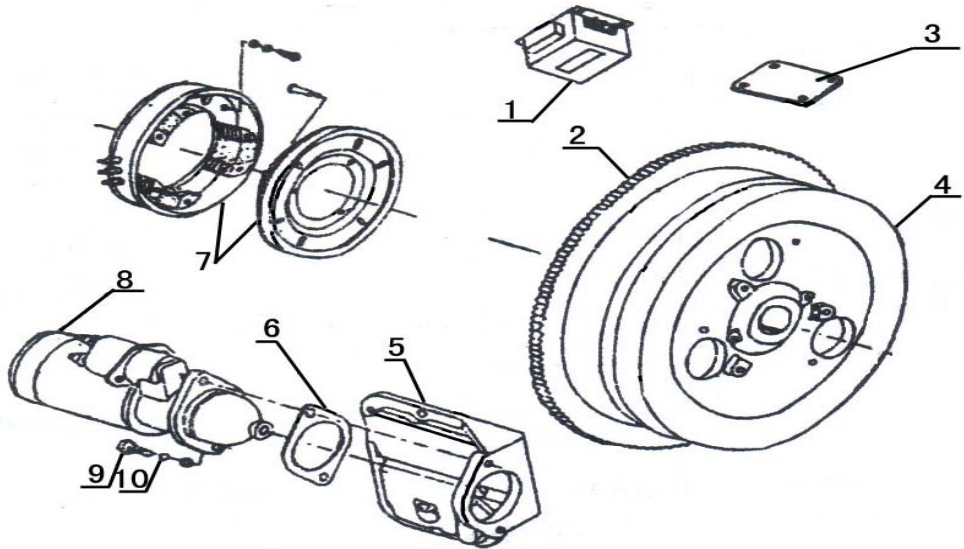
(1) Insert the key into the JK424 switch and turn it to “ I ” position , putting the battery in the main circuit. Then turn the key to “ II ” position, the starter pinion **come** out and engaging with the ring gear to rotate the flywheel. In most cases, the engine will start up running and the lamp will light up about one second. After starting, the key will shift back to “ I ” position immediately, and the starter pinion will draw back of itself. Once the engine starts running normally, turn the key to “III” position to put the generator in the battery. After this, the indicator of ammeter shall rotate counter clockwise and point to “+”.

3. Precautions

- (1) Each starting operation must not last over 5seconds. The interval between two consecutive starting operations shall be at least 2 minutes. Otherwise , the starter will be burnt out and damaged.
- (2) It is forbidden to turn the key to “ II ” position during the running of the engine to prevent the starter pinion and the ring gear from being damaged due to their collision.
- (3) Turn the key back to “0” position and take it out after stopping the engine. If the engine is to be put out of service for a long time, it is advisable to disconnect the wires form the battery to prevent the generator and regulator from being burnt out.
- (4) In case of failing to start the engine on several consecutive times, it is recommended to check the engine and electric system following the procedures mentioned in operation manuals for engine and electric system or consult the professional for maintenance.

Section IV. Modified Parts List or Electrically Started Versions(S1100BM)

No.	Name of Parts	Part No.	Quantity
1	Regulator	KZT—12D	1
2	Ring gear	S195M—05001	1
3	Name plate	S195 (B) (M)—10002	1
4	Flywheel	S195 M—05004	1
5	Rear cover—Starter support	S195M—01020A	1
6	Starter packing	S195M-01018	As required
7	Flywheel Generator	SFF150	1
8	Starter	QD1332	1
9	BoltM12×30	GB/T5783	2
10	Washer12	GB/T93	2



Electrical Started Version



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