OWNER'S MANUAL

AIR-COOLED DIESEL ENGINE

INTRODUCTION

Thank you for purchasing products from our company.

★ Direct injection combustion chamber.

★ Recoil-type manual starter and optional electric starter.

★ Force air cooling system.

★ The fan cover made of low noise composite steel plate.

Series air cooling, direct injection. 4-stroke diesel engine are such a type engine of saving on material and energy, The series engines are small, light. They're easy to maintain, and convenient to move. They are used widely as a power for industrial, agriculturial, machinery tool such as irrigation, spray, rice-transplanting, threshing, grass- cutting, soil-sampling, and also used in vibration rammer, shock rammer, marine engine, light-type transport vehicle, movable-type compressor, light-type generation set, car washing machine, tillage machinery etc.

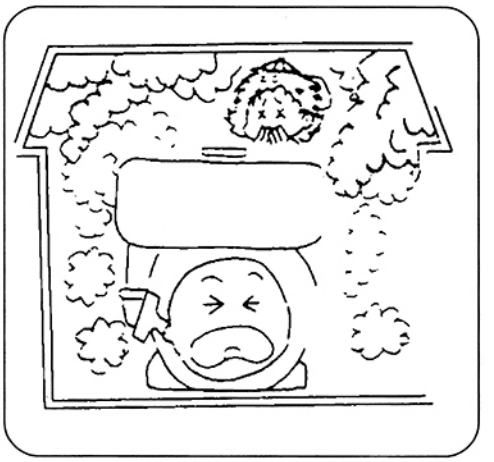
This operating manual will tell you how to operate and maintain your series engines. Please read it before running the engine for correct operation.

Follow the operating requirement in the manual to keep your engine in best working condition and make the engine run longer.

If you have any questions or suggestions about this manual, please contact us or dealer. User should pay attention to that with the improvement of our products the description in this manual may differ from practical products.

CONTENT

Please make sure to follow each precaution carefully.

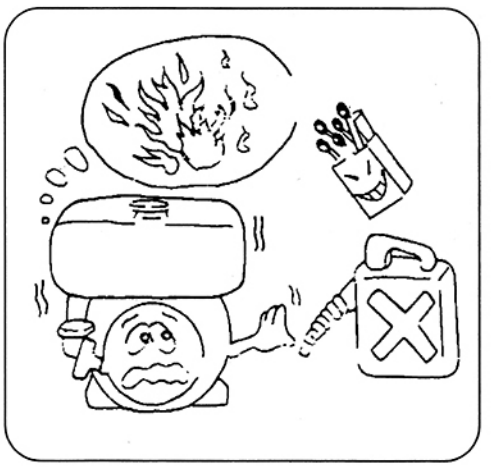


EXHAUST PRECAUTIONS

- Never inhale exhaust gas, It contains carbon monoxide, a colorless, odorless and extremely dangerous gas which can cause unconsciousness or death.
- Never operate the engine indoors or in a poorly ventilated area, such as a tunnel or cave, etc.
- Exercise extreme care when operating the engine near people or animals. Keep the exhaust pipe free of external objects.

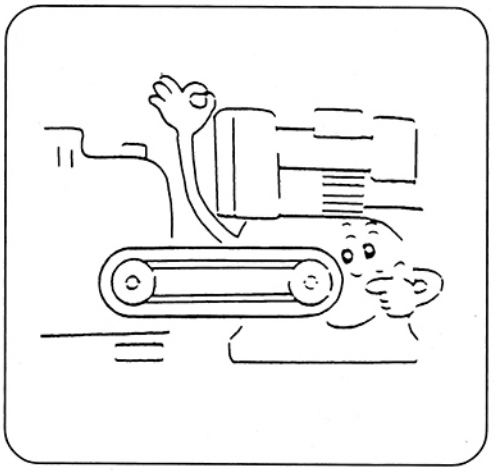
REFUELING PRECAUTIONS

- Be sure to stop the engine prior to refueling.
- Do not overfill the fuel tank.
- If fuel is spilt, wipe it away carefully and wait until the fuel has dried before starting the engine.
- When changing oil, make sure that the fuel cap is secure to prevent spillage.



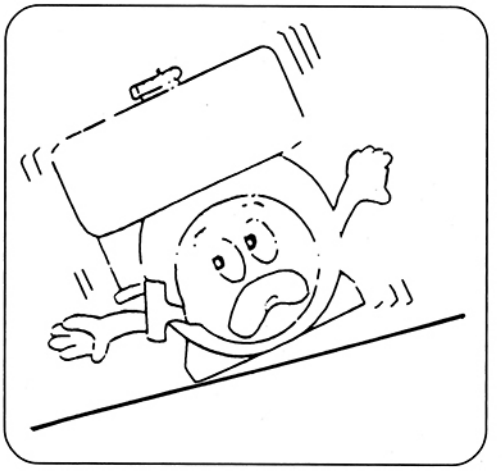
FIRE PREVENTION

- Do not operate the engine while smoking or near an open flame.
- Do not use the engine around dry brush, twigs, clothrags, or other flammable materials.
- Keep the engine at least 3 feet(1 meter) away from buildings or other structures.
- Keep the engine away from flammables and other hazardous materials (trash, rags, lubricants, explosives).



PROTECTIVE COVER

- Place the protective covers over the rotating parts.
  If rotating parts, such as the driving shaft, pulley,belt,etc, are left exposed, they are potentially hazardous. To prevent injury, equip them with protective covers or shrouds.
- Be careful of hot parts.
  The muffler and other engine parts become very hot while the engine is running or just after it has stopped.
  Operate the engine in a safe area and keep children away from the running engine.



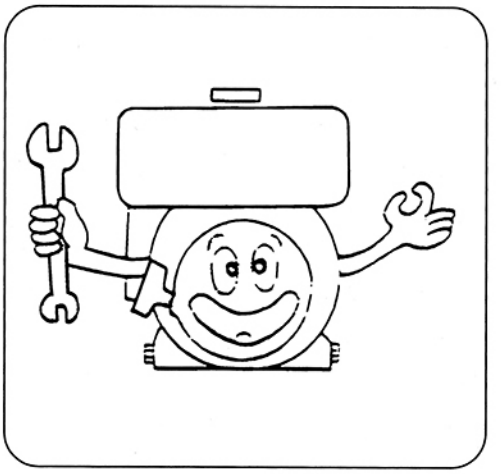
SURROUNDINGS

- Operate the engine on a table, level surface free of small rocks, loose gravel,etc.
- Operate the engine on a level surface. If the engine is tilted,fuel spillage may result.

NOTE:

Operating the engine at a steep incline may cause seizure due to improper lubrication even with a maximum oil level.

- Be careful of fuel spillage when transporting the engine. Tighten the fuel tank cap securely and close the fuel strainer cock before transit.
- Do not move the engine while it is in operation.
- If the engine will be transported over a long distance or on rough roads, drain fuel off from fuel tank to prevent fuel leakage.



PRE-OPERATION CHECKS

- Carefully check fuel pipes and joints for looseness and fuel leakage.
  Leaked fuel creates a potentially dangerous situation.
- Check bolts and nuts for looseness. A loose bolt or nut may cause serious engine trouble.
- Check the engine oil and refill if necessary.
- Check the fuel level and refill if necessary.
  Take care not to overfill the tank.
- Wear snug fitting working clothes when operation the engine.
  Loose aprons, towels, belt, etc., may be caught in the engine or driving train causing a danerous situation.

CHAPTER 1 MAIN TECHNICAL SPECIFICATION AND DATA

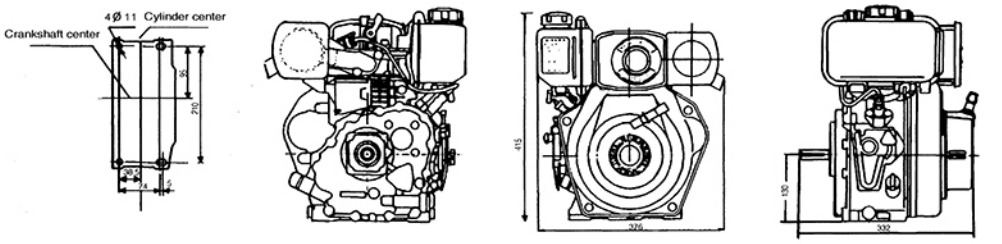
1-1 Main Technical Specification

Item		Technical specification							
Model		D170F		D178F		D186F		D186FA	
Type		Single-cylinder,vertical,4-stroke,air-cooled,direct-injectoin							
Bore x stroke (mm)		70 x 55		78 x 62		86 x70		86x72	
Displacement(L)		0.211		0.296		0.406		0.418	
Normal speed(r/min)		3000	3600	3000	3600	3000	3600	3000	3600
Normal power kW(PS)		2.4(3.27)	2.7(3.67)	3.6(4.90)	3.8(5.17)	5.7(7.76)	6.3(8.57)	5.7(7.76)	6.3(8.57)
Mean speed of piston(m/s)		5.5	6.6	6.2	7.44	7.0	8.4	7.2	8.64
Mean effective pressure kPa(Kgf/cm ^{2})		443.2(4.52)	430.9(4.4)	540.5(5.52)	496.6(5.07)	561.6(5.73)	543.5(5.55)	546(5.57)	502(5.12)
Consumption rate of fuel g/KW (g/PS · h)		≤294(216)	≤303(223)	≤290(213)	≤300(220)	≤289(212)	≤296(218)	≤289(212)	≤296(218)
Consumption rate of machine oil g/KW (g/PS·h)		≤4.08(3)		≤4.08(3)		≤4.08(3)		≤4.08(3)	
Fuel tank capacity(L)		2.5		3.5		5.5		5.5	
Lub.Oil capacity	Full	0.75		1.10		1.65		1.65	
	Effective(L)	0.25		0.40		0.60		0.60	
Rotary direction of cranksfaft		Clockwise from flywheel end							
Cooling type		Forced air-cooled system							
Lub.Type		Pressure, splash							
Starting type		Recoil manual start and optional electric start							
Net weight(kg)		31		38		53		53	

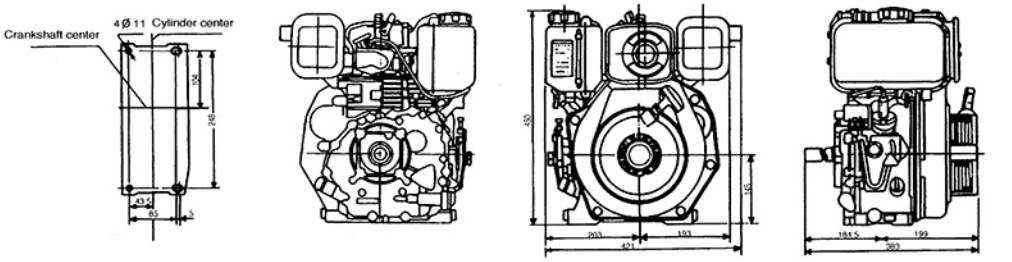
1-2 Overall Dimension and Installation

1-2.1 Overall and installation dimensions

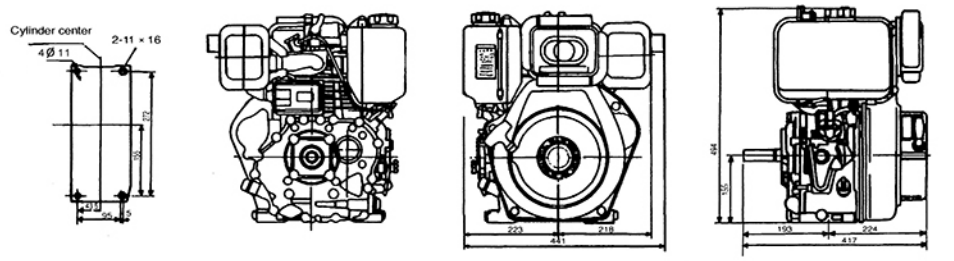
D170F



D178F



D186F/D186FA



1-2.2 Installation

(1) There must be a tight stationary foundation for diesel engine to avoid vibration or movement when the engine is running.

(2) Be sure that the center position of output axle is correct.

(3) Check whether calibration between axle hole of belt wheel and keyway shaft is correct and whether the tighten screw nut of belt wheel is tightened up.

(4) When the engine is matched with other belt-driving machine, the diameter of driving wheel must be in harmony with the speed of diesel engine and the size of axle wheel of the equipped machine.Otherwise it will directly influence working condition of diesel engine, the life of the engine and the efficiency of working machine.

The diameter of driving wheel (belt wheel) can be calculated as follow:

$$\text{Diameter of engine driving wheel} = \frac{\text{Diameter of axle of wheel of working machine}}{\text{Diesel speed}}$$

(5) Be sure that belt is tightened properly.

If the belt is fixed too tight,the engine will be overloaded while starting,the belt will be drawn longer, and the engine may be damaged.

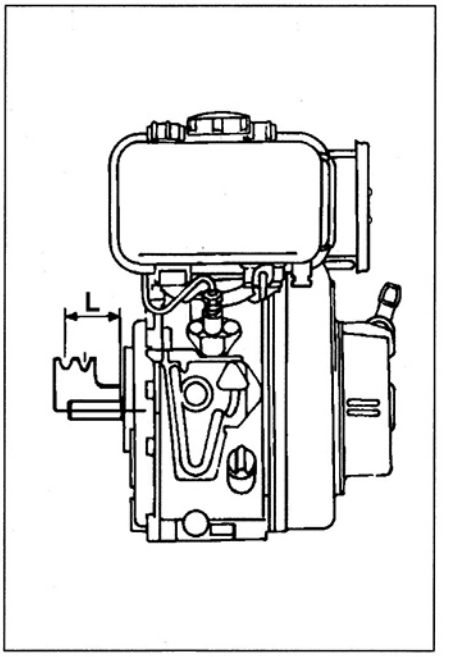
If the belt is fixed too loose,the belt will slip at high speed and high load.

1-2.3 Allowed distance between belt wheel and engine

The V-axle wheel groove should be close to the engine as possible as it can be,the allowed value of L is listed in table 1-1

Note: The meaning of L is shown in figure above. Please contact us or dealer if you have any questions.

Item \ Model		D170F	D178F	D186F D186FA
Belt	Type	A	B	C
	Qty.	2	2	2
Min.diameter of pulley		68	97	135
L		⩽ 80mm	⩽ 70mm	



1-2.4 Crank shaft (Original type) driving angle must be less than 120°, see Fig. 1-1

1-2.5 Tilt

The tilt must be kept within the allowed value shown in Fig. 1-2

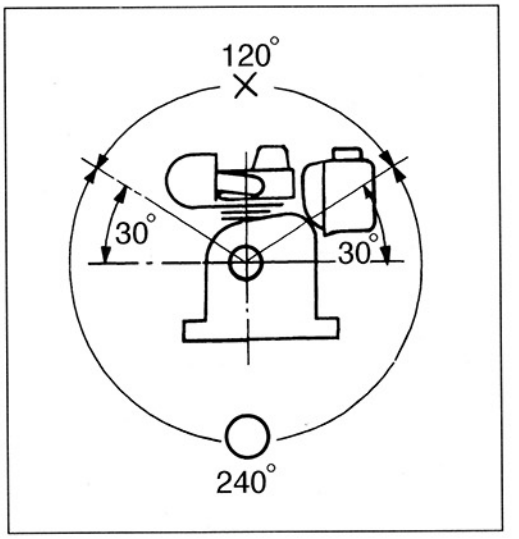


Fig. 1-1

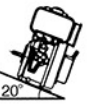
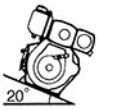
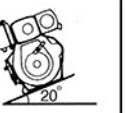
Output Shaft Tilt		
Allowed Tilt (continuous running)	≤ 20°	
Engine Tilt		
Allowed Tilt (continuous running)	≤ 20°	

Fig. 1-2

1-2.6 Please contact our dealer about electric circuit

We recommend to use accumulators (Rated 20 hours) shown in table 1-2.

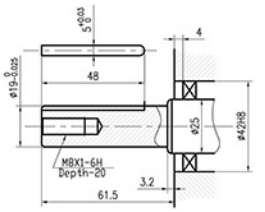
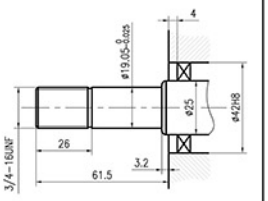
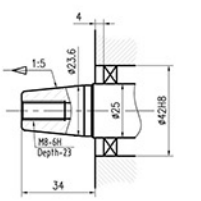
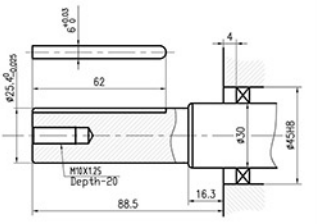
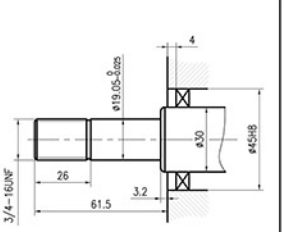
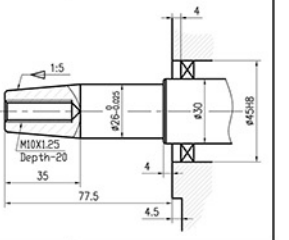
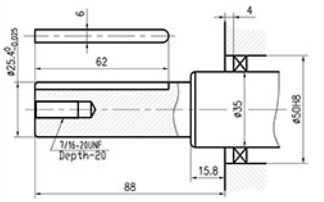
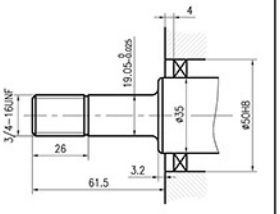
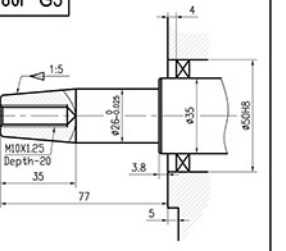
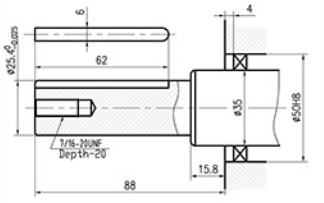
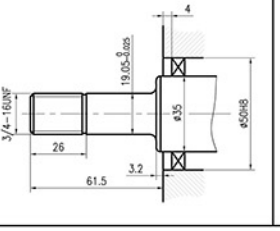
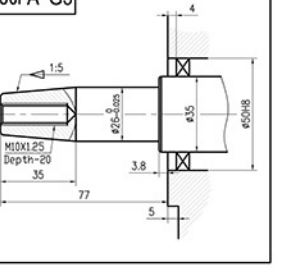
Table 1-2 unit:AH

D170F	18~24
D178F	24~36
D186F	36~45
D186FA	36~45

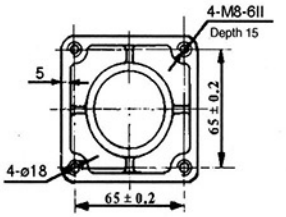
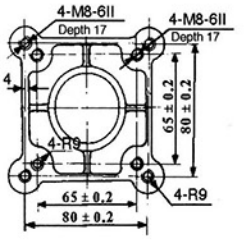
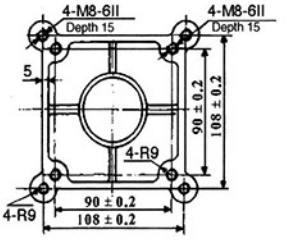
1-3 Connecting Size

1-3.1 Sizes of output shaft

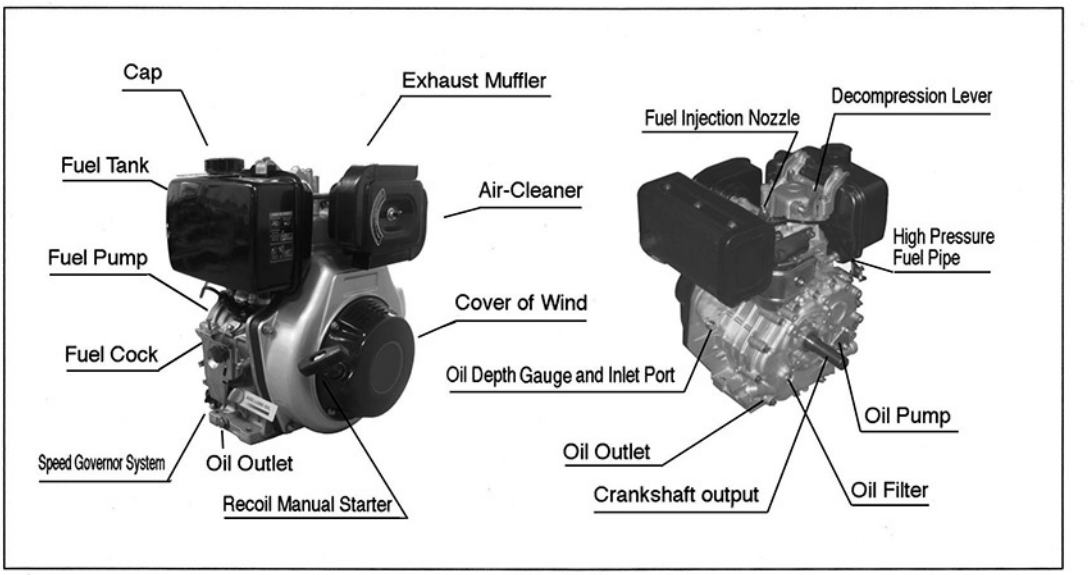
Unit:mm

Model	Keyway shaft	Thread shaft	Taper shaft
D170F	D170F-B 	D170F-P1 	D170F-G2 
D178F	D178F-D 	D178F-P1 	D178F-G3 
D186F	D186F-D 	D186F-P2 	D186F-G3 
D186FA	D186FA-D 	D186FA-P2 	D186FA-G3 

1-3.2 Sizes of PTO flanges

PTO Flanges		
D170F	D178F	D186F/D186FA
		

1-4 Names of Diesel Engine Parts



1-5 Valve Open and Close Phase, Initial Angle of Delivery and Valve Clearance.

1-5.1 Valve open and close phase (see table 1-3)

Table 1-3 unit: CA

Item \ Model	PHASE		
	D170F	D178F	D186F/D186FA
Intake valve open	BTDC 18°30'	BTDC 18°	BTDC 13°
Intake valve close	ATDC 45°30'	ATDC 46°	ATDC 52°
Exhaust valve open	BBDC 55°30'	BBDC 52°	BBDC 57°
Exhaust valve close	ABDC 8°30'	ABDC 12°	ABDC 8.5°

1-5.2 Initial angle of fuel delivery

Table 1-4 unit:CA

D170F	D178F	D186F/D186FA
21° ± 1°		22° ± 1°

1-5.3 Valve clearance

Table 1-5 unit: mm

Description \ Model	D170F	D178F	D186F/D186FA
Intake valve	0.10~0.15 (Cold state)		
Exhaust valve	0.10~0.15 (Cold state)		

1-6 Range of temperature, smoke and pressure Table 1-6

Model	D170F	D178F	D186F/D186FA
Exhaust temperature(℃)	≤ 480		
Machine temperature(℃)	≤ 95		
Smoke (Bosch)	≤ 4		
Pressure of injection M Pa (Kgf/cm²)	19.6 ± 0.49 (200 ± 5)		

1-7 Torque for Tighten up Main Screw Bolt and Nut.

Table 1-7 unit:N-m

Model / Description	D170F	D178F	D186F/D186FA	Note
Connecting rod nut	25~30		40~45	Retighten up after test period
Cylinder head nut	35~40	42~43	55~60	
Flywheel	100~120		120~140	
Nozzle retainer nut	10~12			
Tighten bolt of rocker support	25~30			
Standard m8 bolt	20~30			
Standard m6 bolt	15~20			

CHAPTER 2 ORATION OF DIESEL ENGINE

2-1 Attention for Safe Operation.

2-1.1 The fuel must be filtered by silk fabric or settled for 24 hours before used. Do not add oil into fuel tank or crank shaft case when the engine is running.

2-1.2 Burnable and explosive goods should not exist around the engine, and the place for installation should be plain and ventilative.

2-1.3 Do not touch muffler with your hand when the engine is running or just after it has stopped.

2-1.4 The diesel engine must be run under rated power and rated speed. If you detect abnormal phenomenon, stop the engine immediately to check and remedy.

2-1.5 New engine or newly maintained one must be run at low speed and low load at first 20 hours. Do not allow to run it at high speed and full load.

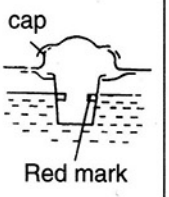
2-2 Choice of Fuel, Lubricant and Preparation Before Start.

Choice of fuel:

Only use light diesel fuel for diesel engine. (No.0 in Summer No.-10 or No.-20 in winter.) Do not allow dust or water in the fuel and fuel tank.

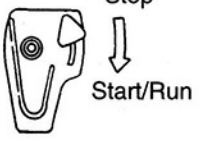
Model	D170F	D178F	D186F D186FA
Capacity Liter	2.5	3.5	5.5
British Gal	0.55	0.76	1.20

Caution:Do not let fuel level be higher than Red Mark



Core of air filter:

Do not wash the core of air filter,because this part is dry type. When power of engine is not good or the color of exhaust is abnormal,change the core.Do not operate the engine without the core of filter.



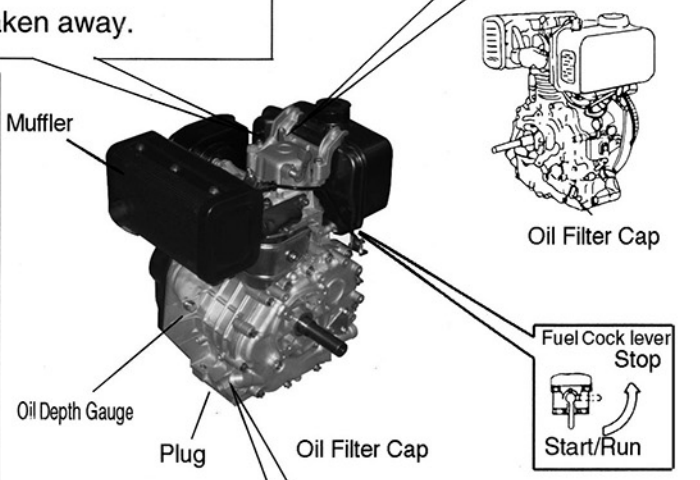
Oiling screw pulg:

In winter,if it is difficult to start the engine, pull out the plug and fill 2cc lube oil into the hole and then return the plug.Keep plug in tight condition.The engine can absorb dust and be damaged if the plug is taken away.

Decompression lever:

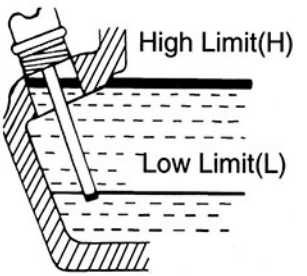
Push decompression lever down to start the machine

The fuel oil and machine oil in the engine were drained away before exfactory.Check fuel pipeline before refilling fuel oil and starting the engine.If there is air in the pipeline, drain it out.The detailed method is to loosen the nut of connection between injection pump and fuel pipe and drain out the air untill there is no bubble in fuel

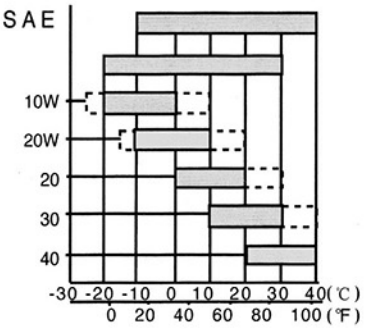


Lubricant inlet:

Set the engine on plane ground and then fill lubricant into the inlet.When checking oil level,put the oil scale into the inlet lightly.Do not turn the oil scale



Model / Capacity	D170F	D178F	D186F D186FA
Litre (British Gal)	0.75 (0.16)	1.1 (0.24)	1.65 (0.36)



Suggested Value

Allowed Limit Value

Be sure to use oil GRADE CC or CD

A.P.I Diesel Engine Service.

If your engine is still a newer one, its life would be shortened for over-load.

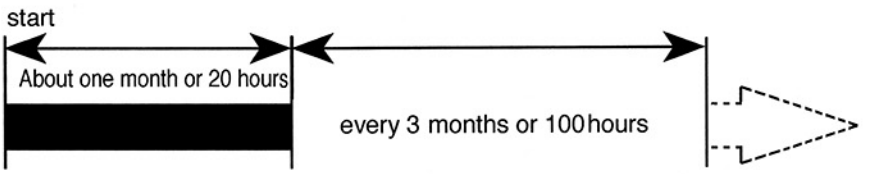
At first 20 hours the engine must be started and stopped according to test run method.

Avoid over-load:

Avoid over load during test run.

Change machine oil regularly:

Change machine oil once every twentyhours or at the end of first month at primary running time and then once every three months or 100 hours.

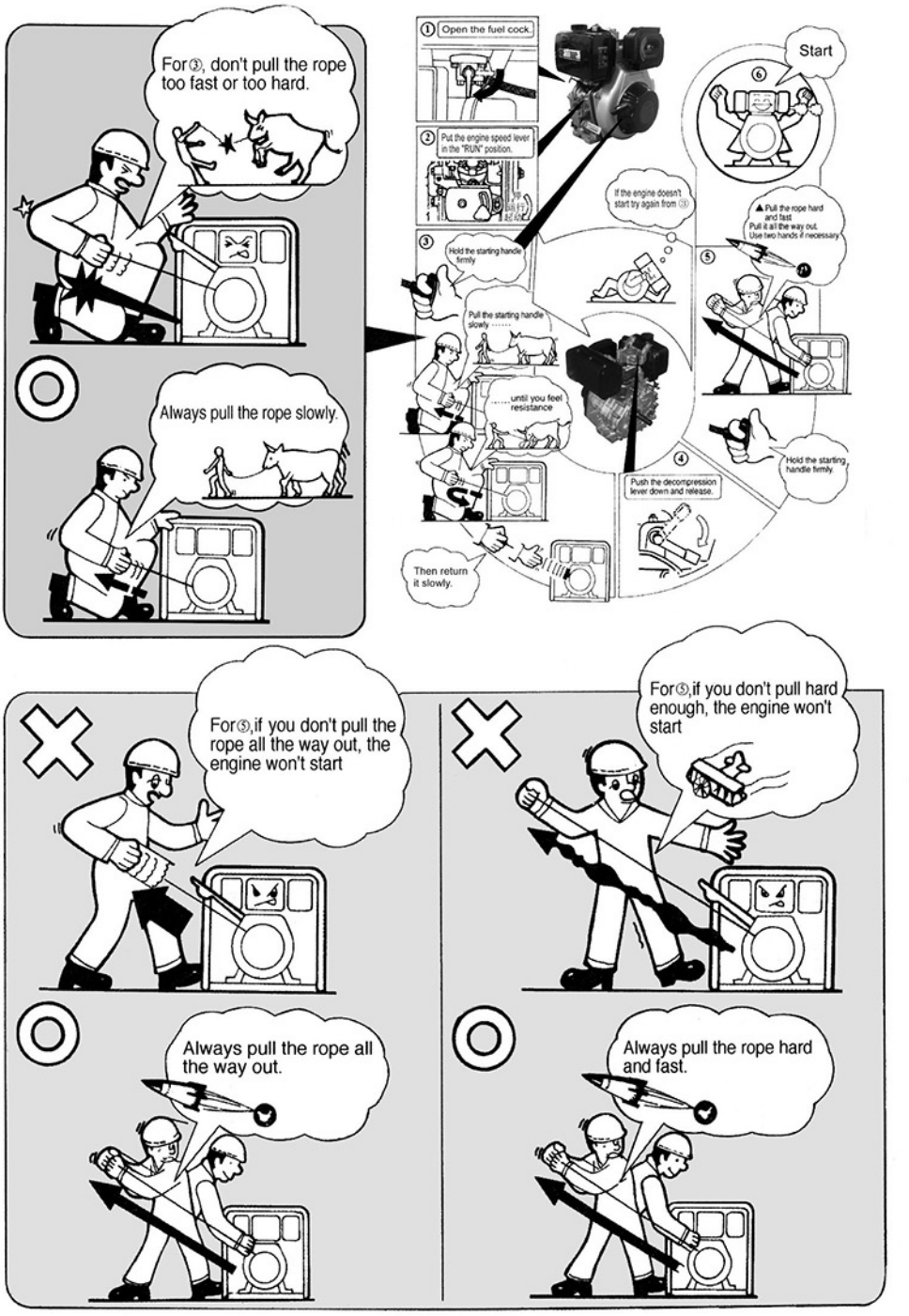


Interval of Changing Machine Oil

2-3 Start of the Diesel Engine

2-3.1 Recoil start

NOTE: WHEN THE ENGINE IS RUNNING , DO NOT PULL THE RECOIL HANDLE OTHERWISE THE ENGINE MAY BE DAMAGED.


For③, don't pull the rope too fast or too hard.
Always pull the rope slowly.
① Open the fuel cock.
② Put the engine speed lever in the "RUN" position.
③ Hold the starting handle firmly
Pull the starting handle slowly ……
……until you feel resistance
④ Push the decompression lever down and release.
Then return it slowly.
If the engine doesn't start try again from ③
⑤ ▲Pull the rope hard and fast
Pull it all the way out.
Use two hands if necessary.
Hold the starting handle firmly.
⑥ Start
For⑤,if you don't pull the rope all the way out, the engine won't start
Always pull the rope all the way out.
For⑤,if you don't pull hard enough, the engine won't start
Always pull the rope hard and fast.

2-3.2 Motor-driven type start

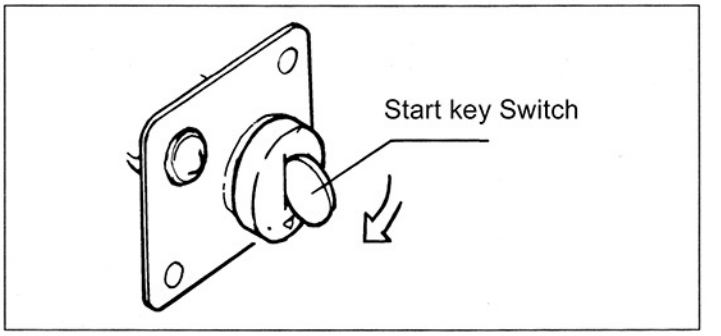
(1) start

The preparation of motor-driven start type is same as manual type (Recoil type).

① Open the fuel cock.

② Set the speed governor lever at "start" position.

③ Turn on the start switch toward clockwise to "start" position.



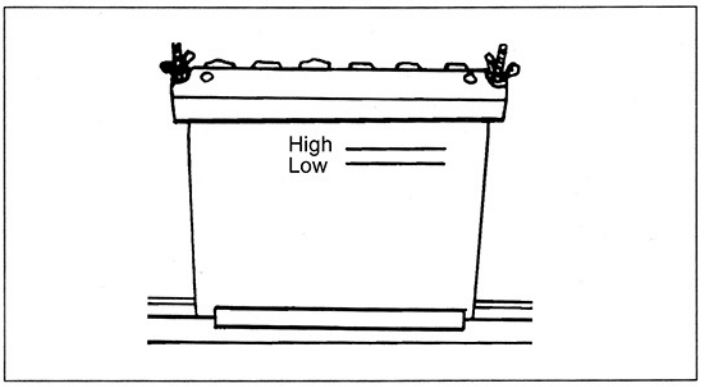
④ If the engine is started, take your hand away from key switch immediately.

⑤ If the engine do not start after 10 seconds, wait for a while (about 15 seconds) then start again.

> If the run time of motor is too long, the voltage of accumulator will drop and the motor may be damaged.
> Keep key switch at "ON" position when the en-glne is running

(2) Accumulator

① Check the liquid level in accumulator every month, if the level is lower than the low limit mark, refill distilled water up to the upper limit mark.



If the liquid in the accumulator is not enough, the electric motor will not run for too little electric current. So, keep the liquid level between upper and low limit marks.

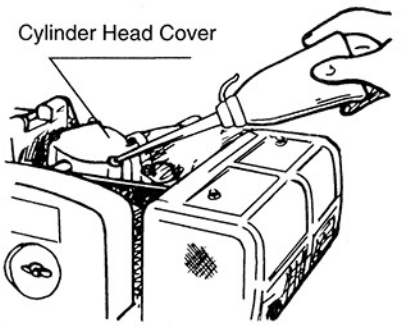
The liquid will splash on near parts (which will be spoiled) if it is too much in the accumulator.

2-3.3 Aided start

If the engine is difficult to start in winter, take off the rubber seal plug and then fill 2cc machine oil into the hole.

Notice:

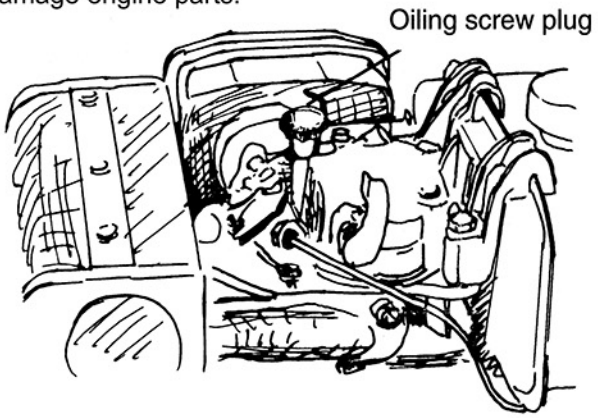
Engines supplied to the torrid zone will not attach the rubber plug.(a solid plug is presented only)



Warning:

Do not use volatile liquid as fuel, such as gasoline etc, and do not take away the air cleaner for easy start of the engine, if you do so, it may cause explosion.

Do not pull out the plug unless filling oil. If plug is not at its correct position, rain, dust or other impurity may be sucked into the engine to cause serious failure or to damage engine parts.



2-4 Run and Stop of the Diesel Engine

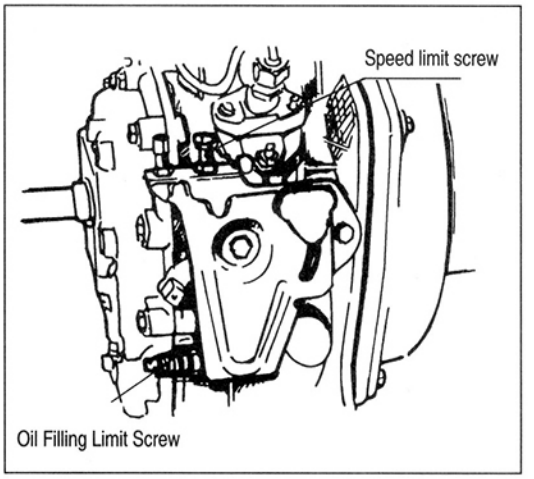
2-4.1 Run of the engine

(1) Preheat the machine for three minutes at no load.

(2) Set the speed govemor lever of the engine at required speed position.

Use the speed governor lever to control the speed of engine.

Do not loosen or readjust the limit screw of speed or oil-filling limit screw, otherwise the performance of the machine may be changed



2-4.2 Check,when the machine is running

(1) Whether there is abnormal sound and vibration?

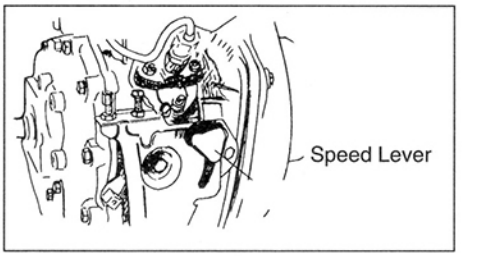
(2) Whether combustion is not good or overspeed?

(3) Whether the color of exhaust gas is normal(black or too white)?

If any of above phenomena is detected, stop the engine immediately and contact our local dealer.

2-4.3 stop of the engine

(1)At first set the speed governor lever at low speed position before stopping the engine,and then run the engine at no-load for three minutes.

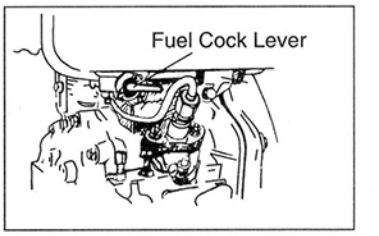


(2) Set the speed governor level at "stop" position.

Decrease the load gradually when stopping the engine. Sudden stop of engine will cause abnormal increasement of temperature.

Do not stop engine with decompression lever.

(3) Set the fuel cock at "S" (stop position)



(4)If the engine possesses motor type starter, turn the start key switch to "OFF" position.

(5)Pull out the recoil handle slowly until pressure is felt by your hand (that means at the point of compression stroke,where the intake and exhaust valves are closed) and then let the handle back to its natural position so that it can prevent rust when the engine is not used.

Note: Only when stopping the engine can you pull the recoil handle, otherwise the engine may be damaged.

CHAPTER3 TECHNICAL MAINTENANCE OF DIESEL ENGINE

3-1 Daily Check and Maintenance

Check oil level of machine oil whether it is between upper and low limit.

Check whether there is oil leakage phenomenon.

Clean up the dirt, greasy dust on the diesel engine and its appendage and keep the engine clean.

Remove malfunction detected during operation.

3-2 Regular Check and Maintenance

Regular check and maintenance are very important for normal operation and durability of the engine. The following table indicates what is necessary and when to check the engine. Marks show special tool or technique is needed for maintenance. Please contact local dealer.

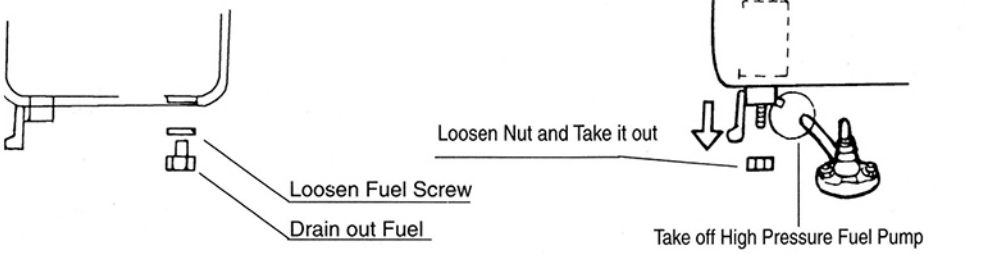
Item \ Time	Daily	After 20 hours or 1 month	100 Hours or Every 3 month	500 Hours Every 6 month	1000 Hours or Every year
Check and tighten the nut screw	○				
Check and fill machine oil	○				
Chang machine oil		○ (First time)	○ (Second time and later)		
Clean and change oil filter				○	● (Change)
Check oil-leakage	○				
Change the core of air filter		Cycle of check and main-tenance will be shortened at dusty place.		○	
Clean fuel tank	Every month				
Clean or change fuel filter				○ (Clean)	○ (Change)
Check nozzle				●	
Check injection pump				●	
Check pipeline of fuel				○ (Change if necessary	
Adjust valve clearance of inlet and exchaust		● (First time)		●	
Grind valve holder of inlet and exhaust					●
Change piston ring					●
Check accumulator liquid	each month				
Clean the core of air filter		○ (Clean) every month or 50 hours			

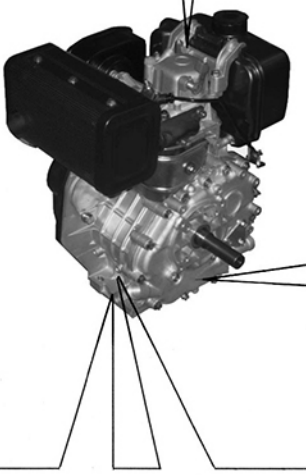
Clean and change fuel filter

The fuel filter must be kept clean day-to-day to guarantee max output of the engine

Take the filter out of fuel tank and clean it.

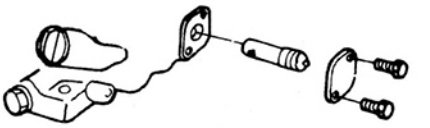
Clean	Every six months or 500 hours
Change	Every year or 1000 hours

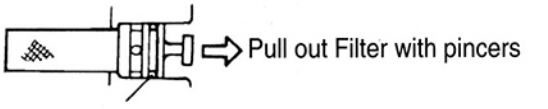




Change Lube oil filter

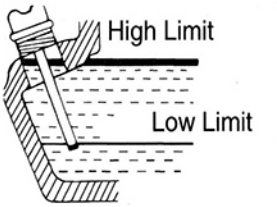
Clean	250 Hours
Change	500 Hours or when maintaining





	D170F	D178F	D186F/D186FA
Capacity(Liter)	0.75	1.10	1.65

Change	Operating period
First	First month or after 20 hours
Second and Later	Every 30 months or 1000 hours



Change the core of air filter

Change	Every 6 months or 500 hours (earlier if necessary)

Do not use detergent to clean filter core.Use a soft brush instead.

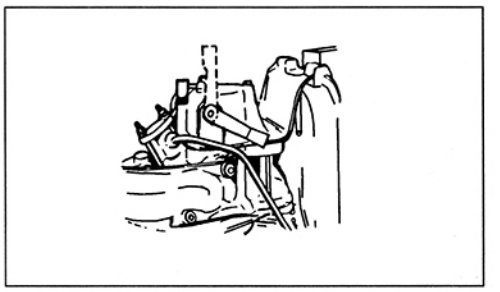
The core of filter obstructtion means that the air in combustion chamber will decrease, and then the output of engine decreases, and consumption of fuel and lubricant increases. It is also difficult to start the engine. Clean the core of filter regularly.

3-3 Storage for a Long Period

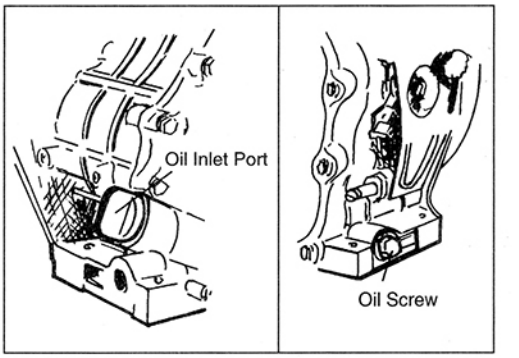
Please do as follow if store the engine for a long period.

(1)Run the machine for three minutes and then stop the machine.

(2)Drain away the lubricant before the engine becomes cool and then refill new machine oil.



(3) Disassemble the rubber plug on the cover of rocker shaft and then fill about 2cc lubricant into it and return the plug to its position.



(4) Recoil type start

Push down and keep the decompression lever at the non-compression point and then pull the recoil starter two or three times.

Motor-driven type start.

Keep the decompression lever at non-compression point and let the engine rotate for two or three seconds with the start key switch on "start" position (Do not run the engine).

(5) Pull up the decompression lever and pull out recoil starter slowly untill the resistance is felt by your hand (that is at the point of compression stroke,where the intake and exhaust valves are closed,which can prevent engine from rust).

(6)Clean out machine oil and dirt from the engine , and to put the engine at a dry place.

CHAPTER 4 MALFUNCTION AND REMEDY OF DIESEL ENGINE

4-1 Cause and Remedy for the Engine Not Being Started

CAUSE	REMEDY
The weather is cold,machine oil become more adhesive	Fill machine oil into crankshaft case after preheated. Fill machine oil into inlet manifold. Disassemble the conection belt of matching machine and then start the diesel engine.Stop the engine when the engine becomes hot and ressemble the belt.Start the engine again.
Malfunction of fuel system. The fuel is mixed with water	Clean fuel tank filter and fuel pipe, change fuel.
The fuel become thickening and not easy to flow	Use the specific fuel
There is air in the fuel system	Drain out the air and tighten each connector of fuel pipe.
Injection fuel is little or no,the spray is not good	Check the position of speed governor handle, clean spray nozzle,fuel pump,maintain or change the pump or nozzle if necessary.
Combustion is not complete	The spray nozzle is not good, delivery angle is not correct, gasket of cylinder head is leaky and the pressure of compression is not enough. Remedy with its cause.
Diesel fuel delivery is interrupted	Diesel fuel is too little in the fuel tank. Fill the fuel into the fuel tank. If the fuel pipe and fuel filter are obstructed or leaky,remedy them.
Compression pressure is not enough in the cylinder, the nut of cylinder head is not tighten or gasket of cylinder is damaged or leaky.	Tighten the nut of cylinder head, according to diagonal line sequence and standard requirement, check gasket of cylinder, if changing the gasket, tighten the nut of cylinder head once again after prerunning the diesel engine.
The gap of piston ring is too big because of wear	Change the piston ring
Each gap of piston rings line up and cause leakage.	Set each gap of piston at angle of 120°

CAUSE	REMEDY
The piston rings are sticked seriously or broken	Clean with diesel fuel or change rings.
Gas valves leakage	Grind the gas valves, if the vestige is too deep, please send it to factory for remedy.
The valve clearance is not correct	Adjust the clearance as specified.
The valve stem is clipped on guide pipe	Disassemble the gas valve and clean the stem and guide pipe.

4-2 Cause and Remedy for Not Enough Power of Diesel Engine

CAUSE	REMEDY
Malfunction of fuel system: parts obstruction of fuel pipeline and fuel filter	Check fuel switch,it must be opened fully. Clean fuel filter and fuel pipeline.
The pumping of fuel is not good	Maintain or change the damaged parts of fuel pump.
Malfunction of nozzle: injection pressure is not correct	Adjust the injection pressure.
Spary hole carbon deposit	Clean.
Needle valve adhered	Clean or change.
Fitting is too loose between needle valve and needle valve body.	Change.
Air filter is obstructed	Disassemble to clean or change the core of filter.
Speed is not high enough	Check the speed of diesel engine with tachometer. Adjust the adjust high speed limit screw.

4-3 Cause and Remedy for the Engine Stopping Automatically

CAUSE	REMEDY
Malfunction of fuel system: No fuel	Add fuel.
Fuel pipeline of filter is obstructed.	Maintain or clean.
There is air in fuel system	Drain out the air.
Needle valve of nozzle adhered	Clean, grind the nozzle or change it if necessary.
Air filter is obstructed	Maintain or brush off.
The load increase suddenly.	Decrease the load.

4-4 Cause and Remedy for Exhaust with Black Smoke

CAUSE	REMEDY
Over load	Decrease the load,if working machine is not properly matched, change it.
Fuel injection is not good.	Check the injection pressure and spray condition and correct it. Or change the nozzle if it is damaged.
Air is not enough or leaky	Clean the air filter, check the cause of leakage and remedy.

4-5 Cause and Remedy for Exhaust with Blue Smoke

CAUSE	REMEDY
There is machine oil, in cylinder	Check oil level,drain away the unnecessary machine oil
Piston ring is clipped or worn, and its springness is not enough or each gap of ring turns to same direction to make the machine oil go up.	Check, change the piston ring, and cross each gap position.
The gap is too big between piston and cylinder	Remedy or change.
Valve and guide are worn.	Change.

4-6Cause and Remedy for Exhaust with White Smoke

CAUSE	REMEDY
There is water in diesel fuel	Clean the fuel tank and diesel filter,change diesel fuel

4-7 Methods and Positions of Stopping to Check When the Engine's Malfunctioning

CAUSE	REMEDY
Speed is sometimes high, sometimes low	Check the speed governor system whether it is nimble.Whether there is air in fuel pipeline.
Abnormal sound suddenly appear.	Check each motional part carefully.
Exhaust with black smoke suddenly	Check fuel system, especially nozzle.
There is metal knocking sound rhythmically in the cylinder.	The fuel delivery angle is too big. Adjust it.