

Operation Manual

GENERAL DIESEL ENGINE C178F/C178FD C186F/C186FD C188F/C188FD



Read and follow the operating instructions and safety information before using for the first time.

Technical changes reserved!

Due to further developments, illustrations, functioning steps and technical data can differ insignificantly.

Updating the documentation

If you have suggestions for improvement or have found any irregularities please contact us.



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Although WilTec Wildanger Technik GmbH has made every effort to make sure that this user manual is complete, accurate and updated, errors cannot always be avoided. In the event of problems with this user manual please complete and send this form back to us.

FAX-notification (+++49 2403 55592-15),

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I would like to report the following mistakes:

Customer Service WilTec Wildanger Technik GmbH

e-mail: service@WilTec.info

Tel:++ +49 2403 55592-0

Introduction

Thank you for purchasing this quality product. **To minimize the risk of injury we urge that our clients take some basic safety precautions when using this device. Please read the operation instructions carefully and make sure you have understood its content.**

The electric part of the device contains no parts that can be inspected or serviced by the user. Leave the maintenance, adjustment and repair to qualified technical personnel. In case of unauthorised intervention the 2-year warranty is no longer valid! Keep these operation instructions safe.

This petrol engine offers

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 engines 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, agricultural, 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.

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, cloths, 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).



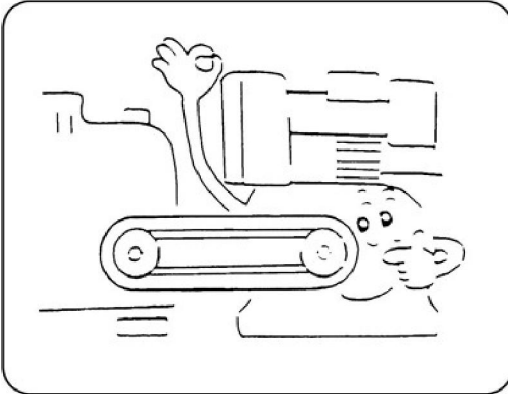
PROTECTIVE COVER

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.

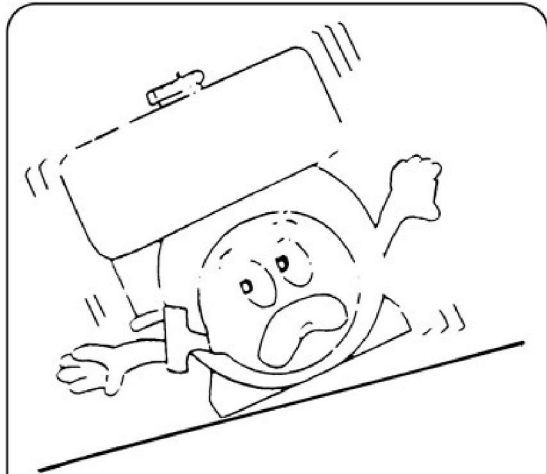
Operate the engine on a level surface. If the engine is tilted, fuel spillage may result.

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.

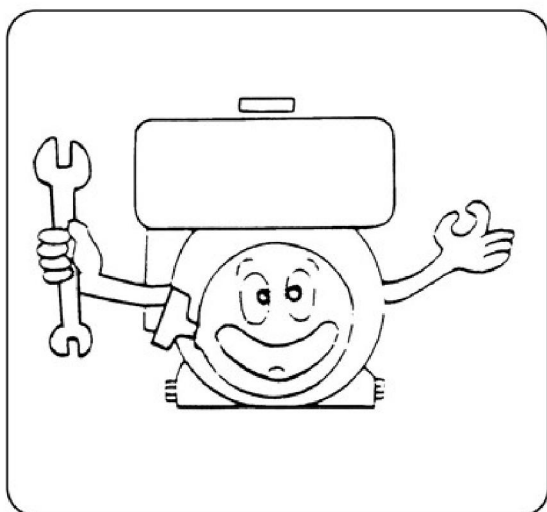
Check the engine oil and refill if necessary.

Check the fuel level and refill if necessary.

Take care not to overfill the tank.

Wear snug fitting working clothes when operating the engine.

Loose aprons, towels, belt, etc., may be caught in the engine or driving train causing a dangerous situation.



CHAPTER1 MAIN TECHNICAL SPECIFICATION AND DATA

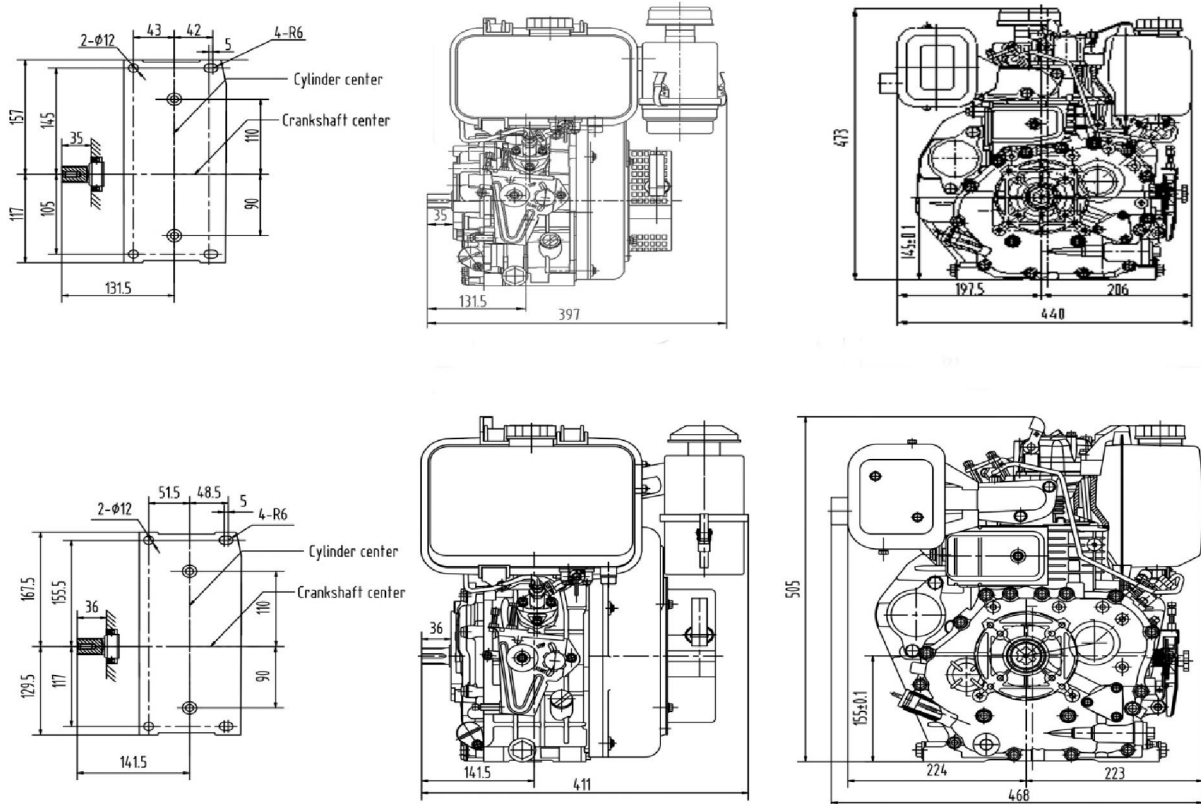
1-1 Main Technical Specification

Table 1-1

Item	C178F/C178FD		C186F/C186FD		C188F/C188FD	
Engine type	4-stroke, OHV, single cylinder, forced air					
Displacement (cm ³)	296		418		456	
Bore xStroke (mm)	78x62		86x72		88x75	
Max. theory power 【kW (PS)/r.min】	4 (5.4) /3000	4.4 (6) /3600	6.4 (8.7) /3000	7.2 (9.8) /3600	7.5(10.2)/3000	8.3(11.3)/3600
Using power recommended 【kW (PS)/ r.min】	3.7 (5.0) /3000	4 (5.4) /3600	5.8 (7.9) /3000	6.3 (8.6) /3600	6.8 (9.2)/3000	7.5(10.2)/3600
Max. torque (N·m/r·min)	13.6N·m/2880r·min		18.7N·m/2880r·min		24.7N·m/2880r·min	
Fuel consumption (g/kW·h)	292		285		285	
Fuel tank capacity(L)	3.5		5.5			
Oil	1.1		1.65			
Oil capacity(L)						
Cooling system	Force air-cooled					
Ignition system	Compaction					
Power output mode	Vertical power shaft					
Start Model	Electric /Manual					
Output direction of power shaft	Counterclockwise					
Dimensions(LxWxH) (mm)	397x440x473		411x468x505			
Dry weight (kg)	33		48		50	

1-2 Overall Dimension and Installation

1-2.1 overall and installation dimensions



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:

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

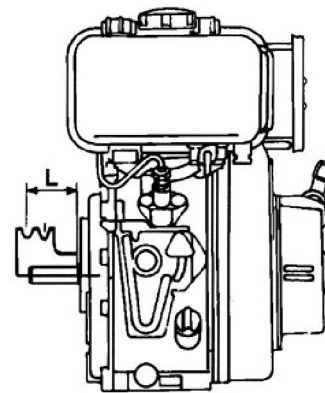
1-2.3 Allowed distance between belt wheel and engine

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 (options) .

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

Table 1-2

Item \ Model		C178F/C178FD	C186F/C186FD	C188F/C188FD
belt	Type	B		B
	Qty.	2		2
Min. diameter of pulley		97		135
L		70mm		



1-2-4 Crank shaft (Original type) driving angle must be than 120°, see Fig 1-1

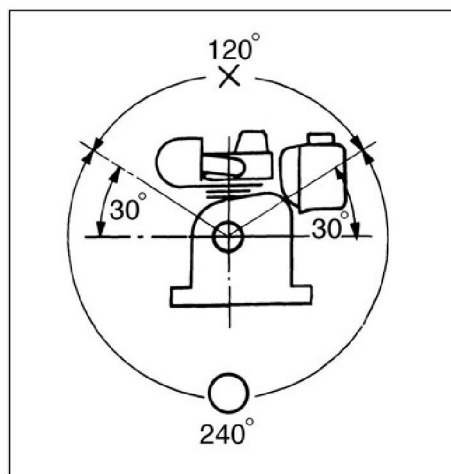


Fig.1-1

1-2-5 tilt

The tilt must be kept within the allowed value shown in Fig.1-3

Fig.1-3	Output shaft tilt		
	Allowed tilt (continuous running)	20°	
	Engine tilt		
	Allowed Tilt (continuous running)	20°	

1-2.6

Please contact our dealer about electric circuit

We recommend to use accumulators (Rated 20 hours)

shown in table 1-4.

Table 1-4

Unit: AH

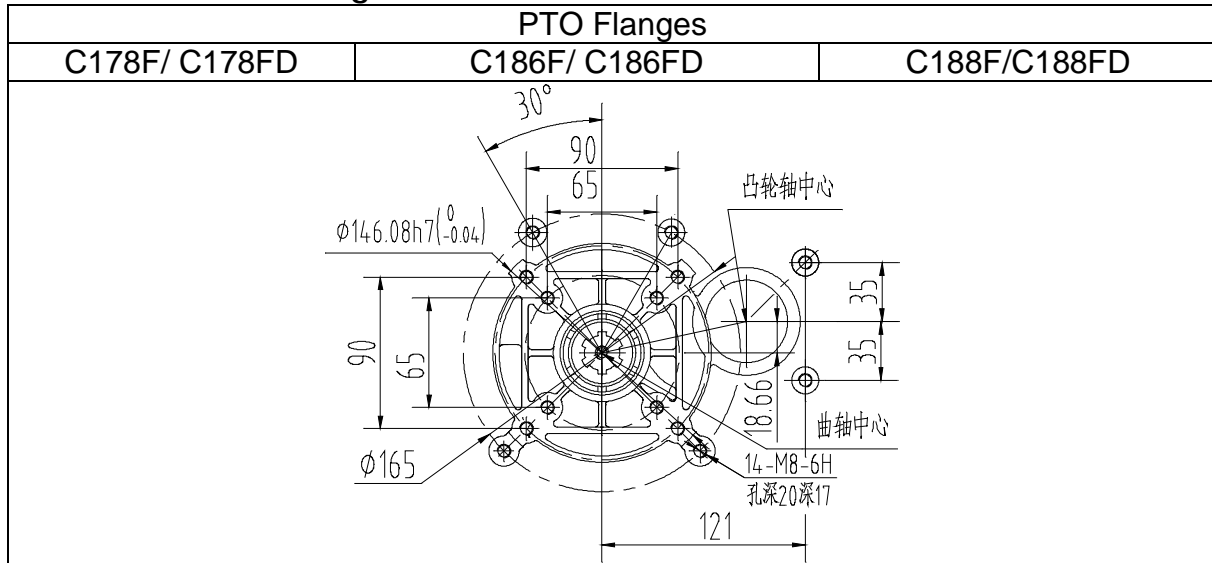
C178F/ C178FD	24 ~ 36
C186F/ C186FD	36 ~ 45
C188F/C188FD	36 ~ 45

1-3 Connecting Sizes

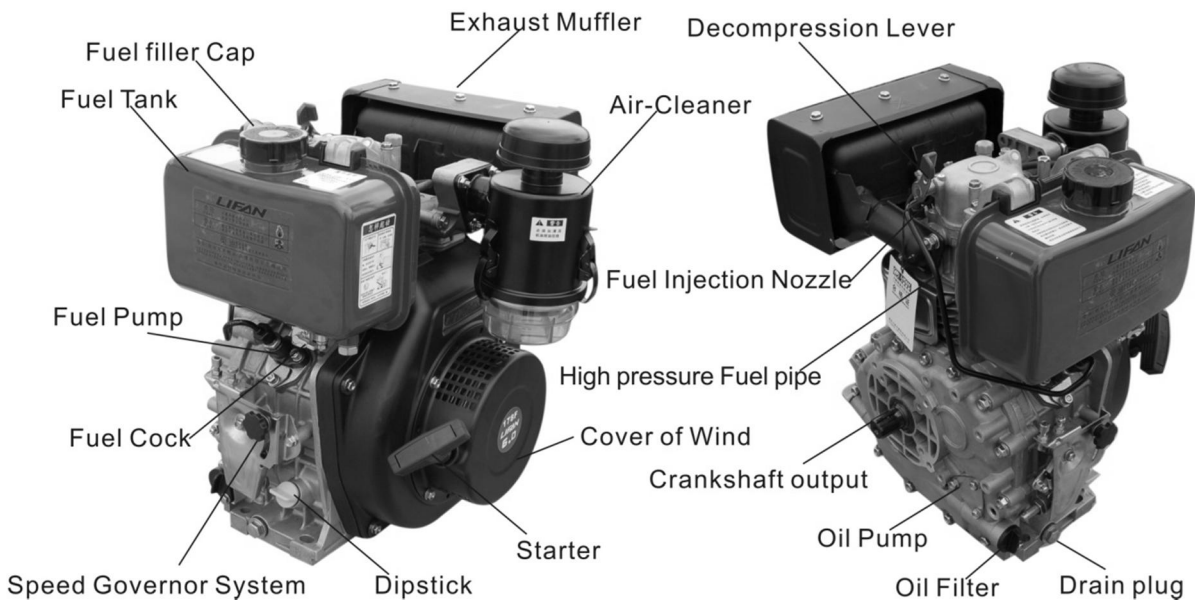
1-3.1 Sizes of output shaft

MODEL	Spline shaft	Taper shaft
C178F/ C178FD		
C186F/ C186FD		
C188F/C188FD		

1-3.2 Sizes of PTO flanges



1-4 Names of Diesel Engine Parts



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

1-5.1 Valve open and close phase (see table 1-5)

Table 1-5

Unit: CA

ITEM	MODLE	PHASE		
		C178F/C178FD	C186F/C186FD	C188F/C188FD
Intake valve open		BTDC 18°	BTDC 13°	BTDC 16°
Intake valve close		ATDC 46°	ATDC 52°	ATDC 44°

Exhaust valve open	BBDC 52°	BBDC 57°	BBDC48°
Exhaust valve close	ABDC 12°	ABDC 8.5°	ABDC12°

1-5.2 Fuel supply advance angle

Table 1-6

Unit: CA

C178F/C178FD	C186F/C186FD	C188F/C188FD
17°±1°		

1-5.3 Valve clearance

Table 1-7

Unit: mm

Description	Model	C178F/C178FD	C186F/C186FD	C188F/C188FD
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 1-8

Description	Mo-	C178F/C178FD	C186F/C186FD	C188F/C188FD
Exhaust temperature ()		500		
Machine oil temperature ()		110		
Smoke (FSU)		4.5		
Pressure of injection MPa (kgf/cm ²)		19.6±0.49 (200±5)		

1-7 Torque for Tighten Up Main Screw Bolt Nut

Table 1-7

Description	Model	C178F/C178F D	C186F/C186F D	C188F/C188 FD	Note
Connecting rod nut (N·m)		18 ~ 21	38 ~ 42	38 ~ 42	Retighten up after test period
Cylinder head nut (N·m)		42 ~ 46	54 ~ 58	54 ~ 58	
Flywheel nut (N·m)		100 ~ 120	130 ~ 150	130 ~ 150	
Nozzle retainer nut (N·m)		10 ~ 12			
Tighten bolt of rocker support (N·m)		25 ~ 30			
Standard M8 bolt (N·m)		18 ~ 20			
Standard M6 bolt (N·m)		10 ~ 12			

CHAPER2 OPERATION 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.

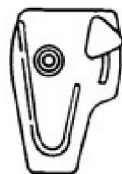
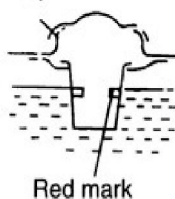
2-2 Choice of Fuel, Lubricant and Preparation Before Start.

Choice of fuel:

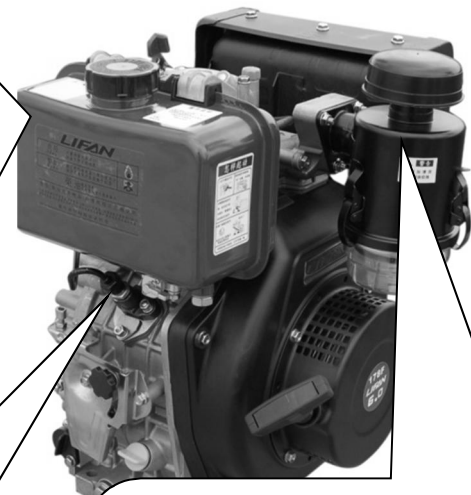
Only use light diesel fuel for diesel engine. (No.0 in Summer No.-10 or No.-20 in winter.) Do not allow dust or water in the fuel and fuel tank.

Model	C178F/C178 FD	C186F/C186 FD	C188F/C188F D
Capacity Liter	3.5		5.5
British Gal	(0.97)		(1.21)

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



Stop
Start/Ru



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

Decompression lever:
Push decompression lever down to start the engine.

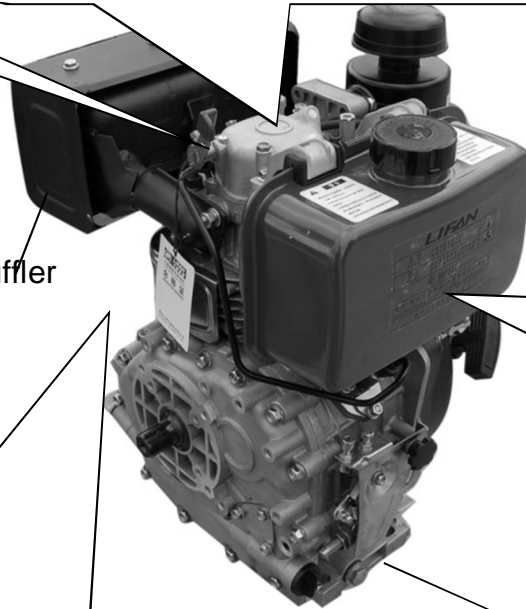
Oiling screw plug:

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.

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 until there is no bubble in fuel.

Muffler

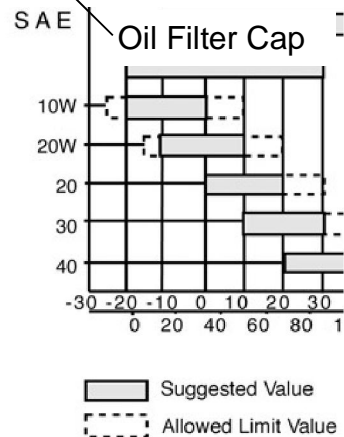
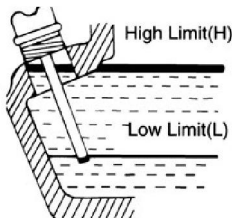
Fuel Cock lever
Stop
Start/Run



Oil Depth Plug Gauge

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	C178F/C178FD	C186F/C186FL	C188F/C188FL
Capacity Liter	1.1	1.65	1.65
British Gal	(0.24)	(0.36)	(0.36)

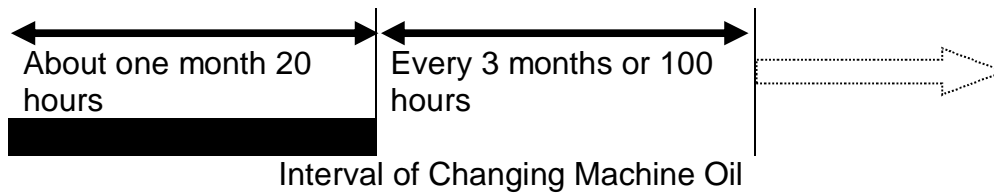
If your engine is still a newer one, its life would be shortened for over-load.
At first 20 hours the engine must be started and stopped according to test run method.

Avoid over-load:

Avoid over load during test run.

Change machine oil regularly:

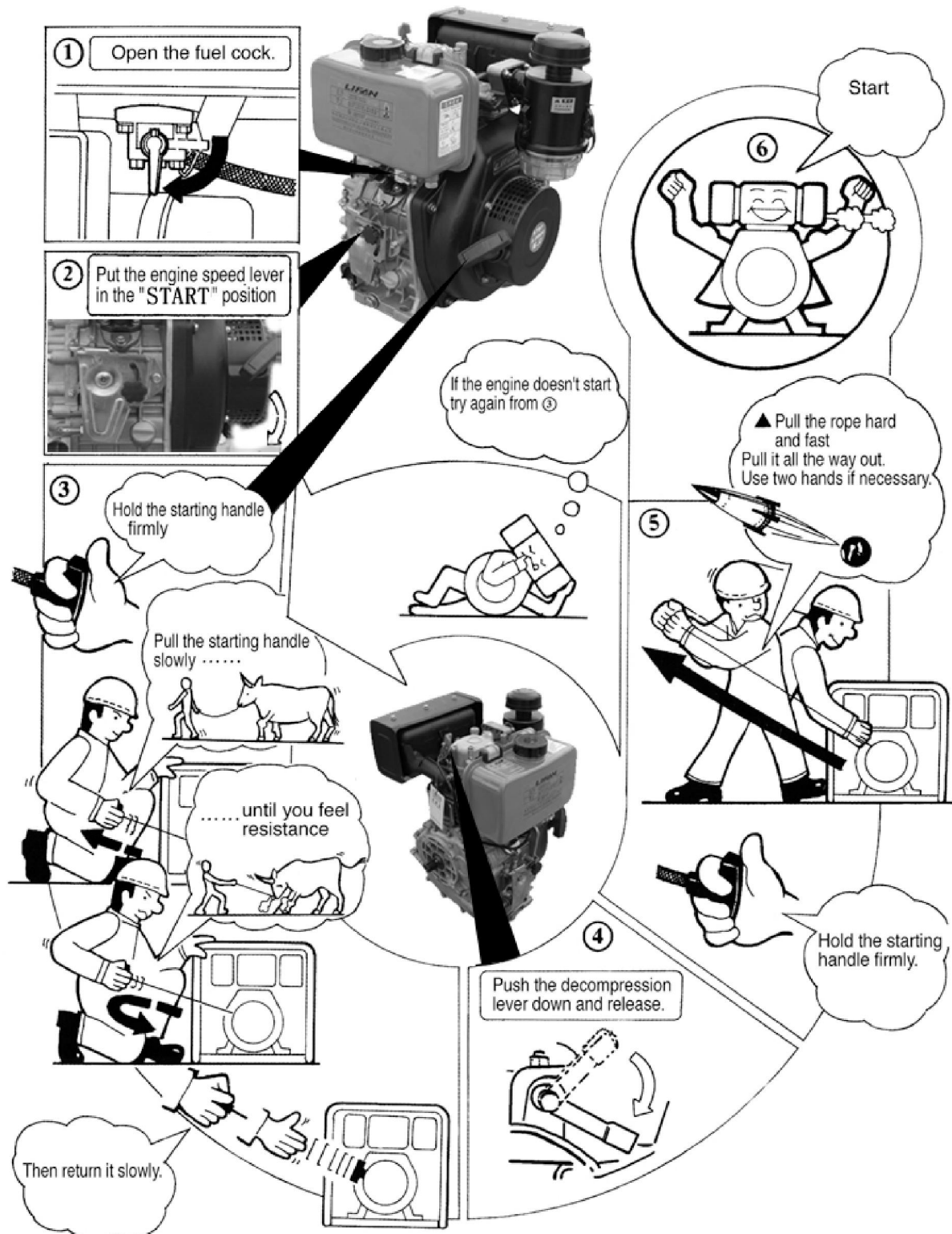
Change machine oil once every twenty hours or at the end of first month at primary running time and then once every three months or 100 hours

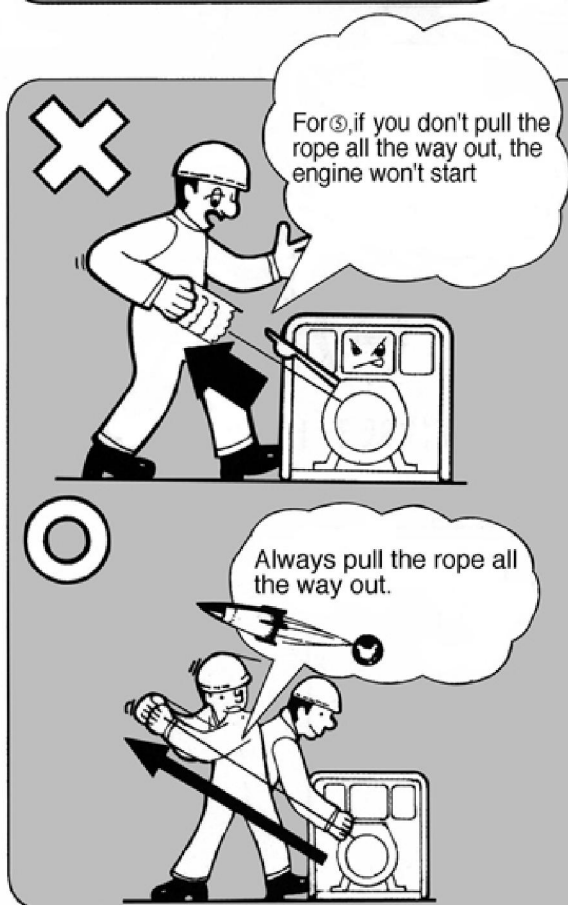
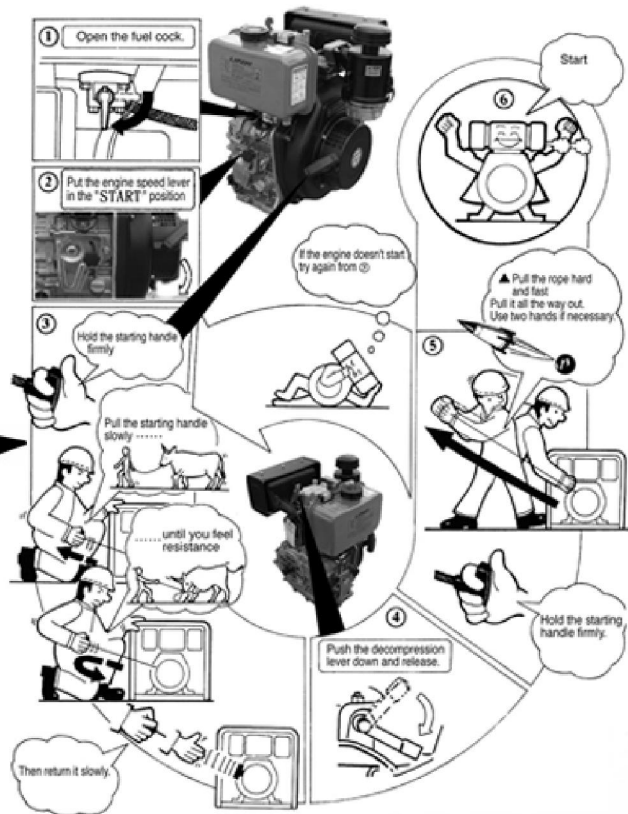
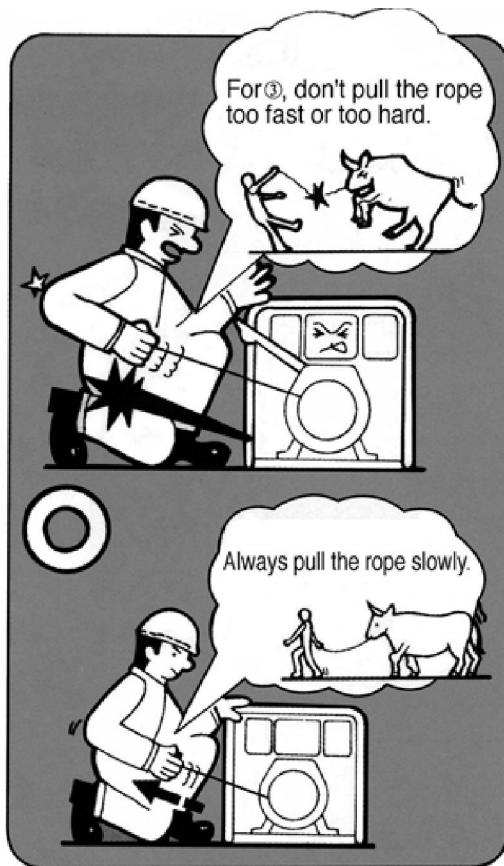


2-3 Start of the diesel engine

2-3.1 Recoil start

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





2-3.2 Motor-driven type start

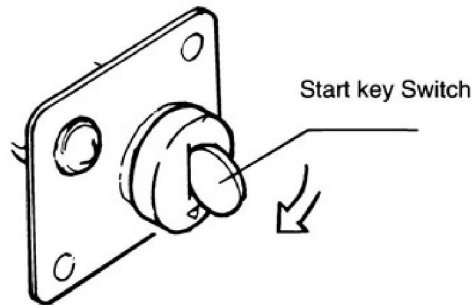
(1) Start

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

Open the fuel cock.

Set the speed governor lever at "start" position.

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



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

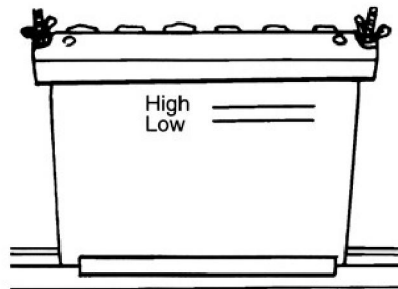
If the engine do not star after 10 seconds, wait for a While (about 15 seconds) then start again.

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 engine is running.

(2) Accumulator (options)

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.

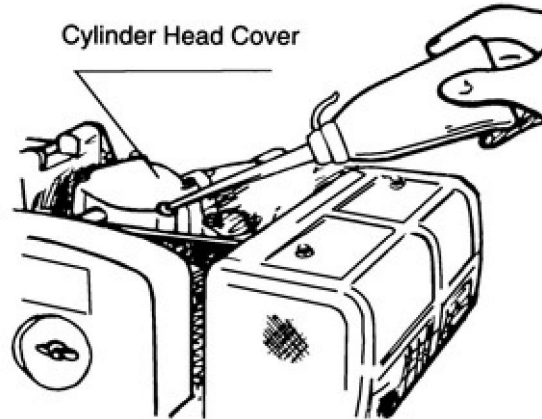
The liquid will splash on near parts (which will be spoiled) if it is too much in the accumulator.

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 :

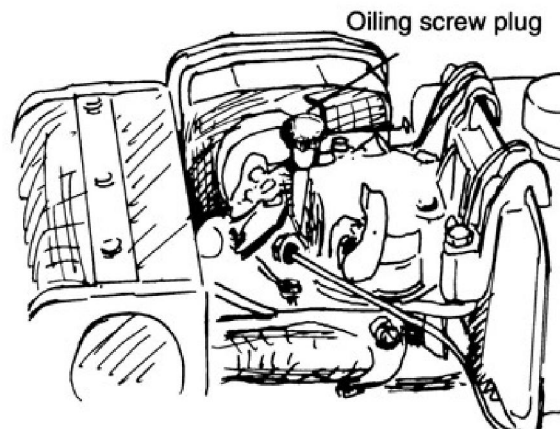
Engine supplied to the torrid zone will not attach the rubber plug. (a soild plug is presented only)



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.

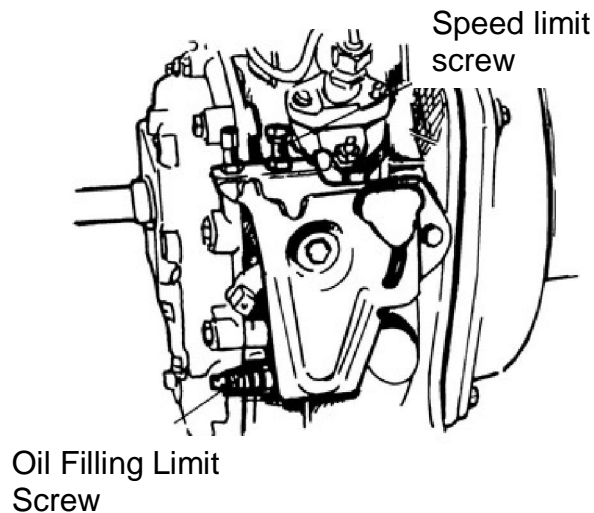


2-4 Run and Stop of the Diesel Engine

2-4.1 Run of the engine

- (1) Preheat the machine for three minutes at no load.
- (2) Set the speed governor 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.



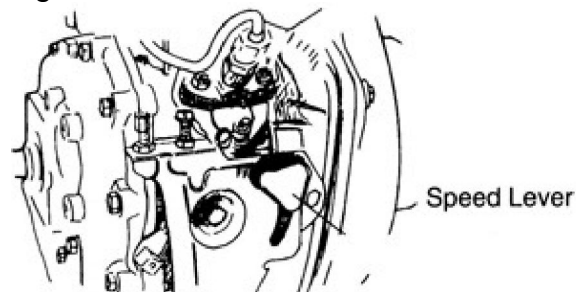
2-4.2 Check, when the machine is running

- (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 lever at "stop" position.

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

3-2 Regular Check and Maintenance

Regular check and maintenance are very important for normal operation and durability of 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.

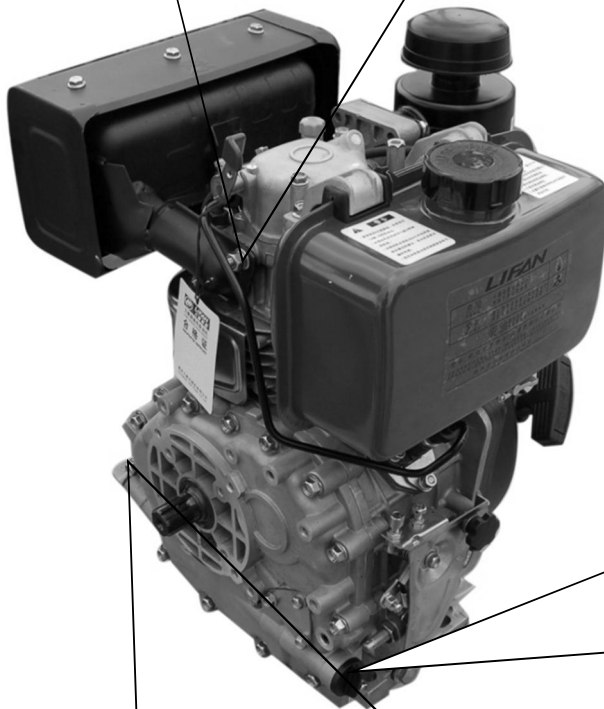
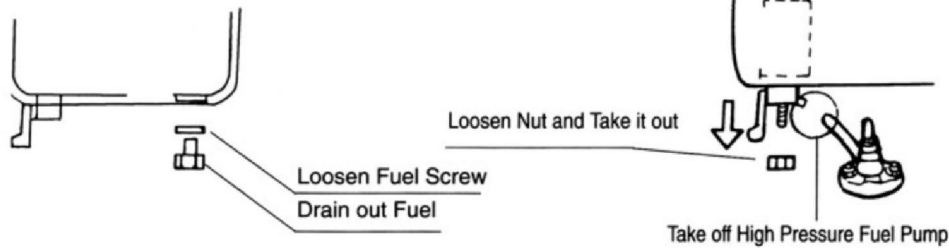
Table 1-8

Items \ Time	Daily	Initial 1 month or 20 Hrs	Initial 3 month or 100 Hrs	Every 6 month or 500 Hrs	Every 1 years or 1000 Hrs
Check and tighten the nut and screw					
Check and fill machine oil					
Change 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 maintenance 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 ne- cessary)	
Adjust valve clearance of inlet and exhaust		(First time)			
Grind valve holder of inlet and ex- haust					
Change piston ring					
Check accumulator liquid	Each month				
Clean the core of air filter		(Clean)every month or 50 Hrs			

Clean and change fuel filter

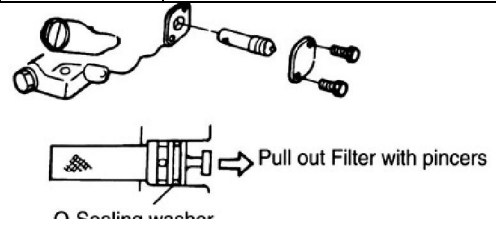
The fuel filter must be kept clean day-to-day to guarantee max output of the engine .
Take the filter out of fuel tank and clean it.

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

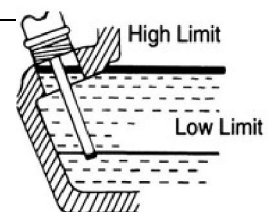


Change Lube oil filter

Clean	
Change	500 Hrs or when maintaining



Model	C178F/C178FD(1D70)	C186F/C186FD(1D100)	C188F/C188FD(1D100)
Capacity (Liter)	1.10	1.65	
Change	Operating period		
First	First month or after 20 Hrs.		
Second and later	Every 30 months or 1000 Hrs		



Change the core of air filter

Change	Every 6 months or 500 Hrs. (earlier if necessary)
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NOTE:

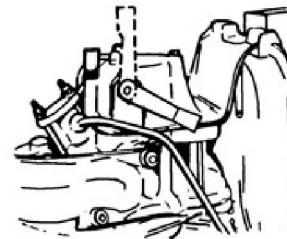
Do not use detergent to clean filter core. Use a soft brush instead.

The core of filter obstruction means that the air in combustion chamber will decrease, and 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.

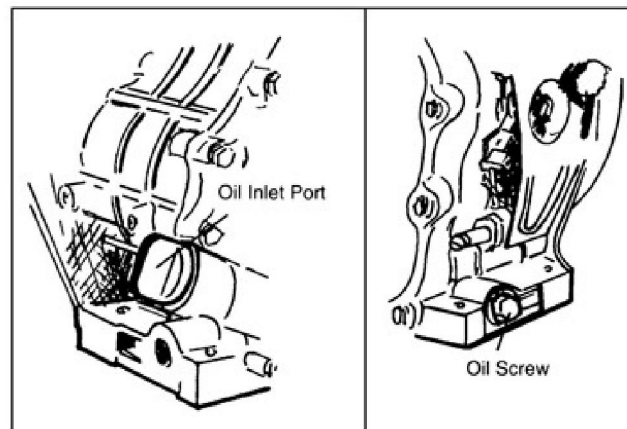
3-3 Storage for a Long period

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 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 until 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.

CHAPTER4 PARTS LIST OF DIESEL ENGINE

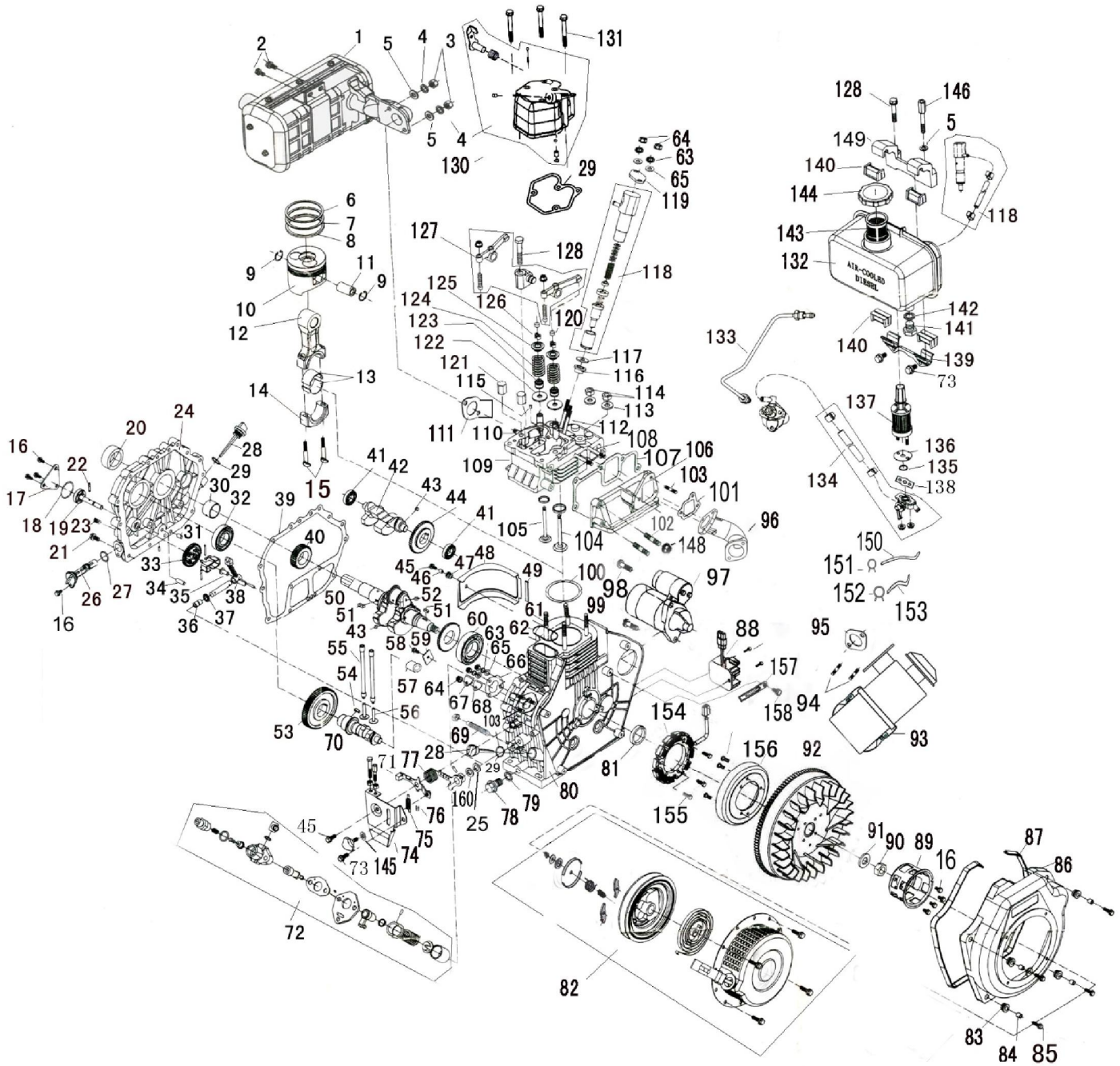


Table 1-9

Item	part#	Description	Qty.	Item	part#	Description	Qty.
1	18000	Muffler	1	41	GB/T276	Bearing 6203 P5	2
2	GB/T5789	Bolt M8x16	2	42	13116	Equilibrium shaft	1
3	GB/T6170	Nut M8	4	43	GB/T1096	Key 5x7	2
4	GB/T93	Ball washer 8	4	44	13151	Balancing shaft	2
5	GB/T97.1	Flat washer 8	5	45	GB/T5789	Bolt M6x18	5
6	13411	Piston ring ()	1	46	16914	Below guide bush	1
7	13412	Piston ring ()	1	47	19123	Below guide damping pastern	1
8	13420	Scraper ring set	1	48	19121	Below guide	1
9	13313	Piston pin circlip	2	49	19122	Below guide airproof pastern	1
10	13311	Piston	1	50	13111	Crankshaft	1
11	13312	Piston pin	1	51	GB/T1096	Key 5x12	1
12	13121	Connecting rod shank	1	52	GB/T308	Steel ball	1
13	13131	Connecting rod shafting	2	53	14119	Timing driving gear	1
14	13122	Connecting rod cap	1	54	GB/T1096	Key 5x14	2
15	13123	Bolt	2	55	14210	Pusher	2
16	GB/T5789	Bolt M6x12	8	56	14315	Tappet	2
17	15112	Cover, oil pump	1	57	GB/T290	Roller bearing HK1512	1
18	GB/T3452.1	O-ing34x1.8	1	58	GB/T5789	Bolt M8x12	1
19	15100	Oil pump assembly	1	59	11151	Bearing stop patch	1
20	GB/T9877.1	Oil seal (35x50x10)	1	60	GB/T276	Bearing 6308 P5	1
21	GB/T5789	Bolt M8x33.5	16	61	11155	Cylinder head connect Bolt	2
22	GB/T119.1	Set pin 3m6x16	1	62	11152	Rectangle pressurize loop	1
23	11221	Plug1/8	1	63	GB/T93	Ball washer 6	5
24	11200	Crankcase cover	1	64	GB/T6170	Nut M6	6
25	26311	Dial adjust washer	各1	65	GB/T97.1	Flat washer 6	5
26	15200	Crankshaft Filter-cover	1	66	28511	Sprinkling pump adjust washer	各1
27	GB/T3452.1	O-ing20x2.52	1	67	28513	Observe hole airproof board	1
28	15511	Dipstick	2	68	28512	Observehole airproof washer	1
29	GB/T3452.1	O-ing19x3.55	2	69	11160	Oil quantity controller subassembly	1
30	11217	Bearing`	1	70	14111	Cam shaft	1
31	GB/T119.1	Set pin8m6x12	2	71	26200	Regulating arm Assy	1
32	GB/T276	Bearing 6207 P5	1	72	28500	Sprinkling pump assembly	1
33	15120	Engine oil pump driven gear subassembly	1	73	GB/T5789	Bolt M6x14	3
34	15215	Enter oil trachea	1	74	26200	Regulating mount	1
35	15123	Engine oil pump driven gear slide sheath	1	75	26117	Back spring	1
36	GB/T290	Roller bearing	2	77	26232	wrest spring	1
37	26290	Bearing HK081410	2	78	11115	Drain plug	2
39	11114	Gasket, crankcase	1	79	11116	Washer	2
40	13113	Timing driving gear	1	80	11100	Crankcase	1

Table 1-9 (continue)

Item	part#	Description	Qty.	Item	part#	Description	Qty.
81	GB/T9877.1	Oil seal (35x50x8)	1	121	12155	Gasket, cylinder head cover	2
82	23200	Recoil starter	1	122	14417	Spring seat	2
83	19224	an hood damping pastern	4	123	14430	Valve Oil seal subassembly	2
84	19225	Fan hood bush	4	124	14414	Valve spring	2
85	GB/T5789	Bolt M6x25	4	125	14415	Intake valve	2
86	19211	Fan hood	1	126	14418	Split pin	2
87	19223	Fan hood airproof pastern	1	127	14330	Rocker abutment subassembly	1
88	31140	Voltage adjustment assembly	1	128	GB/T16674.1	Bolt M8x45	3
89	23316	Starting flange	1	129	12212	Gasket, cylinder head cover	1
90	23317	Nut	1	130	12200	Cylinder head cover	1
91	23319	Flywheel nut washer	1	131	GB/T5789	Bolt M6x70	3
92	23300	Flywheel assembly	1	132	16500	Fuel filler cap Assy	1
93	17100	Air cleaner assembly	1	133	28610	High-handed vita subassembly	1
94	GB/T899	Bolt M8x28	2	134	16640	Fuel cock	1
95	17113	Air cleaner washer	1	135	GB/T3452.1	O-ing13x2	1
96	17214	Air cleaner linker	1	136	16664	Fuel filter washer	1
97	24100	Starting motor assembly	1	137	16660	Fuel filter parts	1
98	GB/T5789	Bolt M10x28	2	138	16643	Fuel switch washer	1
99	11156	Cylinder head connect Bolt	2	139	16580	Fuel filler cap below bracket subassembly	1
100	12121	Gasket, cylinder head	1	140	16911	Fuel tank cushion	4
101	17221	Air cleaner linker washer	1	141	GB/T5786	Bolt M12x1.25x14	1
102	11153	Gasket, cylinder head	5	142	16671	Oil box discharge bolt washer	1
103	GB/T900	Bolt M6x30	2	143	16610	Filter cup subassembly	1
104	14411	Intake valve guide	1	144	16400	Fuel filler cap	1
105	14412	Exhaust valve guide	1	145	GB/T96.1	Flat washer 6	6
106	12151	Cylinder head ir intake pipe	1	146	16548	Fuel filler cap bracket bolt	1
107	17219	Intake pipe washer	1	147	GB/T16674.1	Bolt M6x14	2
108	GB/T900	Bolt M6x93	2	148	GB/T6177.1	Nut M6	6
109	12100	Cylinder head assy	1	149	16543	Fuel filler cap bracket	1
110	GB/T899	Bolt M8x32	2	150	16627	Outlet pipe	1
111	18215	Exhaust gasket	1	151	16624	Pipe clamp	2
112	GB/T900	Bolt M6x62	2	152	16622	Pipe clamp	2
113	12157	Cylinder head nut washer	4	153	16621	Outlet pipe	1
114	12156	Cylinder head nut	2	154	31110	Stator assembly	1
115	GB/T119.1	Set pin 4m6x8	1	155	GB/T819.2	Bolt M6x12	3
116	12158	Heat insulation sheath	1	156	31120	Rotor assembly	1
117	28712	Sprinkling machine adjust washer	各1	157	19316	Clip	1
118	28700	Sprinkling machine assembly	1	158	GB/T5789	Bolt M6x8	1
119	28711	Sprinkling machine seasaw	1	159	GB/T819.1	Bolt M6x12	3
120	14416	Cap	2	160	26113	拨叉调整垫片	1

CHAPTER5 MALFUNCTION AND REMEDY OF DIESEL ENGINE

5-1 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 pre-heated. Fill machine oil into inlet manifold. Disassemble the connection 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.
Malfuction of fuel system. The fuel is mixed with water.	Clean fuel tank filter and fuel pipe, change fuel.
The fuel become thickening and 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.
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 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°
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 ternity.
The valve stem is clipped on guide pipe.	Disassemble the gas valve and clean the stem and guide pipe.

5-2 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.
Spray 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.

5-3 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.

5-4 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.



5-5 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 springiness 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.

5-6 Cause 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.

5-7 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.

CHAPTER6 WIRING DIAGRAM

