



PLATE COMPACTOR

MVC-F60/F70/F80/ F82/88G/98D

INSTRUCTION MANUAL



Contents of "Declaration of Conformity"

Please refer the
EC DECLARATION OF CONFORMITY
in this manual as well.

**We thank you for selecting
Mikasa Plate Compactor. For
your safe and proper operation,
please read this manual and be
always sure to keep it ready for
reference.**


Original



MIKASA SANGYO CO.,LTD.

402-03019

1) DECLARATION OF CONFORMITY

2) Manufacturer's name and address.	Mikasa Sangyo Co., Ltd. 4-3, Sarugaku-cho 1 chome, Chiyoda-ku, Tokyo101-0064, Japan
3) Name and address of the person who keeps the technical documentation.	Yoshiharu Nishimaki, engineer R. & D. Division, Mikasa Sangyo Co., Ltd. Shiraoka-machi, Saitama, Japan
4) Type: Vibratory Plates	
5) model	See NEXT PAGE for DETAILS
6) Equipment item number	
7) Serial number	
8) power source cont. output <max. output>	
9) Measured sound power level(dB)	
10) Guaranteed sound power level(dB)	
11) Max. Sound pressure level(dB)	
12) Conformity assessment according to Annex:	VIII (Full Quality Assurance procedure)
13) Name and address of the Notified Body	Société Nationale de Certification et d'Homologation (SNCH) 11, route de Luxembourg L-5230 Sandweiler LUXEMBOURG
14) Related Directive	Directive 2000/14/EC and, to be followed by Directive 2005/88/EC , relating to the noise emission in the environment by equipment for use outdoors.
15) Declaration	The equipment referred in this document, fulfills with all the requirements of Directive 2000/14/EC
16) Other related Community Directives	2006/42/EC, 2005/88/EC, 2004/108/EC, 2002/88/EC(2004/26/EC) EN500-1, EN500-4
17) EC Conformity Certificate No:	e13*2000/14*2005/14*0472*01
18) Place and date of the declaration	Tokyo, Japan Apr, 2010 Signed by:  Keiichi YOSHIDA Director, Product Control Division Mikasa Sangyo Co., Ltd.

5) model	MVC-F60R (VAS)	MVC-F60H (VAS)	MVC-F70R	MVC-F70H	MVC-F80R (VAS)	MVC-F80H (VAS)
6) Equipment item number	352192 352197 352198 352203 352205 352215 352220 352221 352223 352225 352227 352230	352191 352196 352216 352218 352219 352226 352229 352246	352533 352537 352538 352540 352543 352545	352532 352534 352539 352546	352567 352568 352570 352571 352575 352576 352578 352580 352588	352559 352564 352565 352572 352573 352574 352579
7) Serial number	For serial number, please refer it on front page.					
8) power source cont. output <max.output>	Robin EX13 2.2kW <3.2kW>	Honda GX120 2.1kW <2.6kW>	Robin EX17 2.9kW <4.2kW>	Honda GX160 2.9kW <3.6kW>	Robin EX17 2.9kW <4.2kW>	Honda GX160 2.9kW <3.6kW>
9) Measured sound power level(dB)	100	101	102	102	101	101
10) Guaranteed sound power level(dB)	105	105	105	105	105	105
11) Max. Sound pressure level(dB)	89	89	91	91	90	90

5) model	MVC-F82R VAS	MVC-F82H VAS	MVC-88GE (VAS)	MVC-88GH (VAS)	MVC-98D (VAS)	
6) Equipment item number	352589 352591	352587	352363 352364 352383 352390 352397 352398 352400 352401 352350	352367 352369 352373 352380 352391 352394 352395 352399 352405 352416	352412 352419 352424	
7) Serial number	For serial number, please refer it on front page.					
8) power source cont. output <max.output>	Robin EX17 2.9kW <4.2kW>	Honda GX160 2.9kW <3.6kW>	Robin EX17 2.9kW <4.2kW>	Honda GX160 2.9kW <3.6kW>	Yanmar L48N 3.5kW <4.7kW>	
9) Measured sound power level(dB)	101	101	102	104	104	
10) Guaranteed sound power level(dB)	105	105	105	105	108	
11) Max. Sound pressure level(dB)	90	90	94	94	93	

Hand-Arm Vibration Level

Model	Ahv (m/sec ²)
MVC-F60H	7.3
MVC-F60R	7.0
MVC-F70H	5.8
MVC-F70R	6.3
MVC-F80H	6.7
MVC-F80R	7.0
MVC-88GH	4.7
MVC-88GE	4.8
MVC-98D	5.4
MVC-F60H VAS	3.3
MVC-F60R VAS	3.2
MVC-F80H VAS	3.8
MVC-F80R VAS	3.5
MVC-88GH VAS	2.1
MVC-88GE VAS	1.7
MVC-98D VAS	2.3

Remarks

Vibration Level is in comply with EU Directive 2002/44/EC and the value is shown as 3 axis min. vibration level. Test course (Crushed gravel) is in comply with EN500-4.

The above values are subject to change in case that the machine is modified or/and the required regulations change.

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1. Preface

- This operation manual describes the proper operation, basic inspection and maintenance procedures of the plate compactor. Please read this operation manual before use in order to maximize the excellent performance of this machine and make your work more efficient and effective.
- After reading the manual, please keep it in a handy location for easy reference.
- For the handling the engine, please refer to the separate engine operation manual.
- For inquiries about repair parts, parts lists, service manuals, and repairs, please contact the store where you purchased the product, our sales office, or the Mikasa Parts Service Center. For parts lists, please visit our homepage at: <http://www.mikasa.com/> where you can access Mikasa WEB parts lists.

The illustrations in this manual might slightly differ in part from the machine you actually purchased due to design changes.

2. Applications, Warnings, Structure and Power Transmission

Applications

Plate compactor is the machine that compacts the ground and it intends to make the surface smooth, by transmitting vibration through vibrating plate, which power generated from single rotor in vibrator case.

This machine is suitable for making the ground surface smooth, such as leveling the soil and beaching, finishing the asphalt paving.

Warning about incorrect applications and techniques

This machine is hard to move forward on a soil with much water (especially clay soil). It is not suitable for such application. This machine is difficult to level a ground include big stones due to insufficient compacting force. Plate compactor is mainly applied for compacting surface smooth and it is not effective for jobs that requires heavy compaction. In case of compacting ground deeply into lower layer, it is recommended to use Tamping Rammer, Vibro Compactor or Vibration Roller of which compacting force is rather effective. Please use this compactor for compacting surface on soil, sediment, beaching and asphalt. It is not recommended for use this machine for the other applications.

Structure

The upper part is made up of Power source, Handle, Belt Cover, Water Tank for sprinkling and Guard Hook which are fixed by Engine Base. The Engine base is fixed on Vibrating Plate by Shock Absorbing Rubber. The lower part is made up of Vibrating Plate and Vibrator Unit that has an Eccentric rotary shaft built in. The power source is transmitted from the centrifugal clutch on engine output shaft to the Eccentric rotary shaft through V-belt.

Power transmission


Air-cooled Single Cylinder Engine is mounted as power source and Centrifugal Clutch is fixed on engine output shaft.






Centrifugal Clutch engages by running up the engine and engine R.P.M. is reduced to suitable number for compacting. The rotation of engine is transmitted from V-pulley integrated with Clutch Drum to Vibrator Pulley through V-belt.

Vibrator Pulley rotates Eccentric Rotor Shaft that is contained in Vibrator Case. The generated vibration created from Eccentric Rotor is transmitted to Vibrating Plate.

Vibration of Vibrating Plate carries the machine forward; the vibration with the weight of the machine makes the compaction of the ground possible.








3. Warning Symbols

The triangle marks () used in this manual and on the decals on the machine are warning symbols. Please follow these precautions.




	Warning symbols indicating personnel hazards
	Extremely hazardous. If the warning is not followed, it is likely to result in serious injury or death.
	Hazardous. If the warning is not followed, it is likely to result in serious injury or death.
	Potential hazard. If the warning is not followed, it may result in injury.
Precautions (without  mark) If the warning is not followed, it may result in property damage.	

4. Safety Precautions


4.1 General Precautions

	<ul style="list-style-type: none"> ● Do not operate the machine, <ul style="list-style-type: none"> ○ If you do not feel well due to overwork or illness. ○ If you are taking any medicine. ○ If you are under the influence of alcohol. 	
	<ul style="list-style-type: none"> ● Read this manual carefully and handle the machine as described to ensure safe work. ● For details about the engine, refer to the separate manual for the engine. ● Make sure you understand the structure of the machine well. ● For safe work, always wear protective gear (helmets, safety shoes, ear plugs, etc.) and work in appropriate clothes. ● Always check the machine before your work to make sure it is in normal condition. ● Decals on the machine (operation method labels, warning labels, etc.) are very important for your safety. Keep the machine clean so that the decals can be read all the time. Replace a decal if it becomes illegible. ● Before performing maintenance work, be sure to turn the engine off. ● It is very dangerous if children come into close contact with the machine. Have the utmost concern about how and where to store the machine. In particular, for an engine with a cell, always remove the starter key and keep it in a designated place. ● Before inspection and maintenance work, stop the engine, and do your work on a flat surface area. If a cell is attached, remove the battery wiring before your work. ● Mikasa does not accept any responsibility for accidents caused by remodeling or rework done on the machine. 	   

4.2 Refueling Precautions

	<ul style="list-style-type: none"> ● When adding fuel, <ul style="list-style-type: none"> ○ Make sure you work in a well ventilated location. ○ Make sure the engine is stopped and wait until it cools down. ○ Take the machine to a clear flat location without any combustibles nearby. Be careful not to spill the fuel. Wipe well if any spill occurs. ● Do not fill to the rim due to potential spillage. ● After adding the fuel, tightly close the tank cap. 	 
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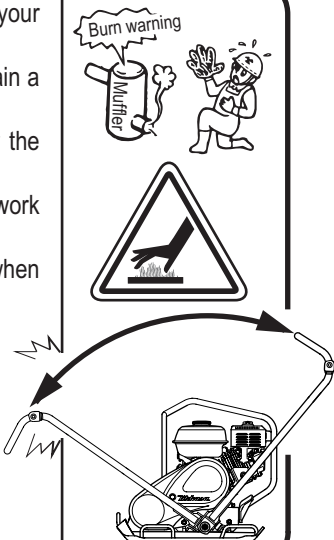
4.3 Location and Ventilation Precautions

<p>⚠ DANGER</p>	<ul style="list-style-type: none"> ● Do not run the machine in an unventilated location, such as indoors or inside a tunnel. The exhaust gas from the engine contains toxic gases such as carbon monoxide and is very hazardous. ● Do not operate the machine near open flames. 	
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4.4 Precautions Before Starting

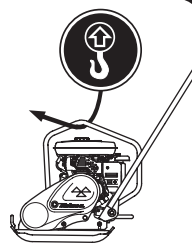

<p>⚠ CAUTION</p>	<ul style="list-style-type: none"> ● Check each part to see if it is tightened properly. Vibration causes loosening of bolts, which results in unexpected serious malfunctions of the machine. Tighten the bolts securely. 	
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4.5 Precautions During Work


<p>⚠ CAUTION</p>	<ul style="list-style-type: none"> ● Before starting the machine, make sure it is safe to start by checking your surroundings for people and objects. ● Always pay attention to your footing. Work in an area where you can maintain a good balance of the machine and a safe comfortable posture. ● The engine and muffler become very hot. Do not touch immediately after the machine stops because they are still very hot. ● If you notice deterioration of machine operation during your work, stop your work immediately. ● Before moving away from the machine, be sure to turn the engine off. Also when the machine is transported, stop the engine and close the fuel cock. ● Keep its safety in turning a handle back and forth. (MVC-F82/88G/98D) An attached handle is movable. Keep its safety by clearing any obstacle in handle motion. In case of the operation turning a handle forward, move a handle down slowly by holding a handle, to resist its weight. 	
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4.6 Lifting Precautions




For unloading using a crane, a licensed crane operator is needed. An operator should be qualified for crane and hooking work.

<p>⚠ DANGER</p>	<ul style="list-style-type: none"> ● Before lifting, check the machine parts (especially the hook and anti-vibration rubber) for any damage and loosened or missing bolts. ● Stop the engine and shut the fuel cock while lifting. ● Use a wire rope with sufficient strength. ● For lifting, use only one point hoisting hook, and do not lift at any other part. ● When the machine is hoisted, never let people or animals come underneath. ● For safety reasons, do not lift to a height that is higher than necessary. 	
<p>⚠ CAUTION</p>	<ul style="list-style-type: none"> ● Use lifting handles for lifting up by hand. (MVC-F82) In case of loading/unloading or lifting transportation by hand, hold each lifting handle or lifting edge securely located in vibrating plate. Do not use the operation handle for lifting up. This lifting handle is for manual lifting only. Do not use this lifting handle as a machine lift point. Use the lifting point on the top of the machine. 	

4.7 Transportation and Storage Precautions

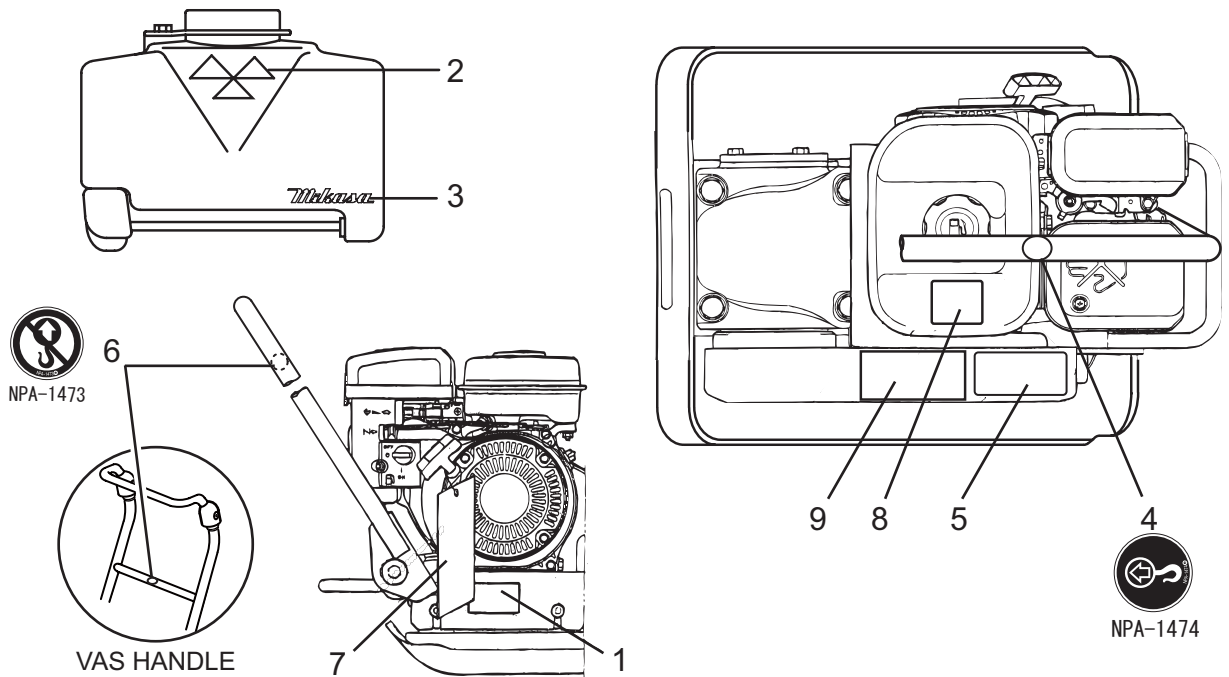
	<ul style="list-style-type: none"> ● Stop the engine during transportation. ● Transport after the engine and the machine are cooled down. ● Always drain the fuel before transporting. ● Securely fix the machine to prevent it from moving or falling during transportation. 	
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4.8 Maintenance Precautions

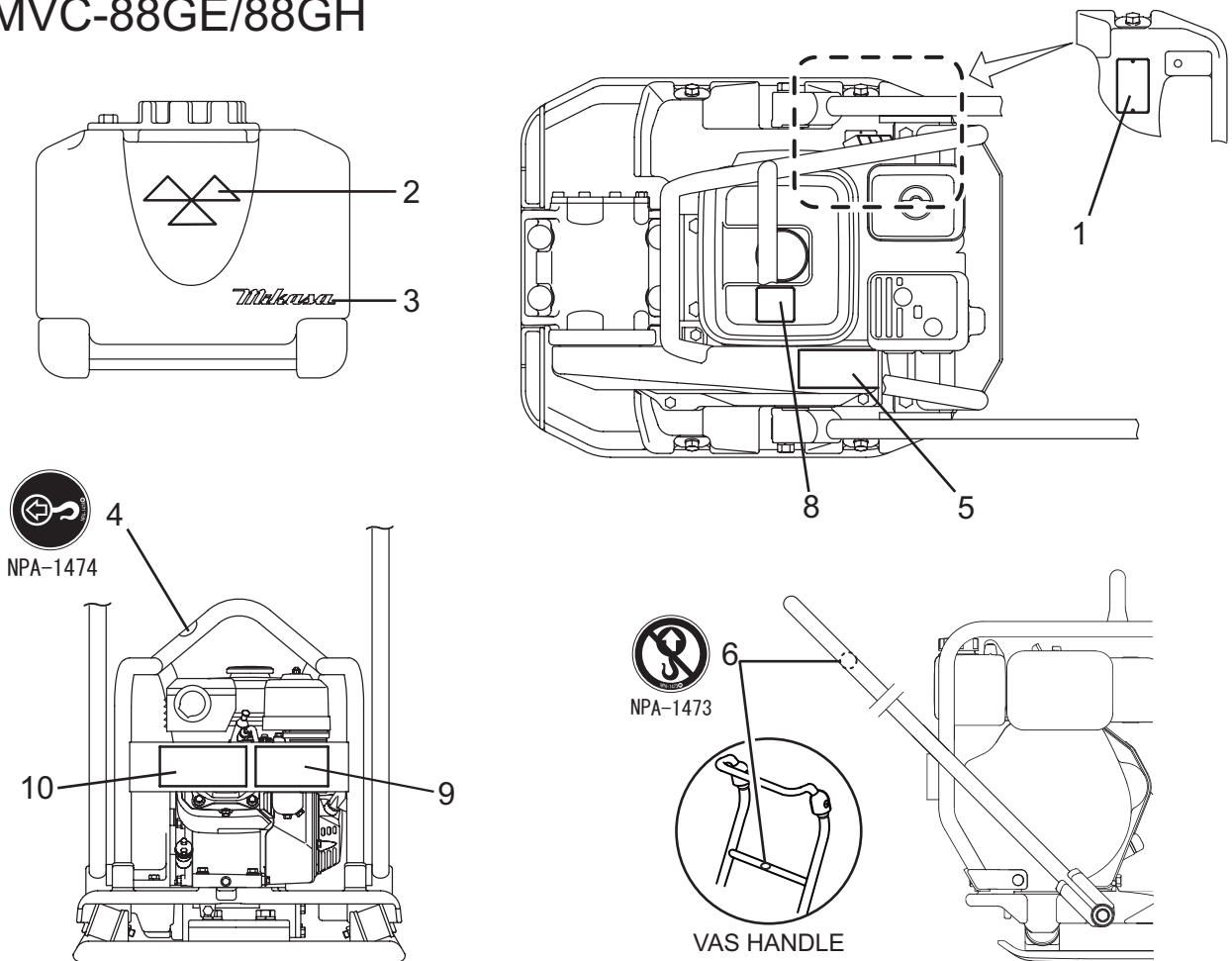
	<ul style="list-style-type: none"> ● Appropriate maintenance is required to ensure safe and efficient operation of the machine. Always pay attention to the machine's condition and keep it in good condition. Pay special attention to the parts used for lifting, if they are not maintained properly, it might result in a serious accident. ● Start maintenance work after the machine has cooled down completely. The muffler, in particular, becomes very hot, and there is a danger of burn. The engine, engine oil and vibrator also become very hot. Be careful not to get burned. 	
	<ul style="list-style-type: none"> ● Always stop the engine before inspection and adjustment. If you are caught in a rotating part, serious injury might occur. ● After maintenance work, check the security parts to see if they are securely installed. Special attention should be paid when checking bolts and nuts. ● If disassembly is involved in maintenance, refer to the maintenance instruction manual to make your work safe. 	

4.9 Labeling Position

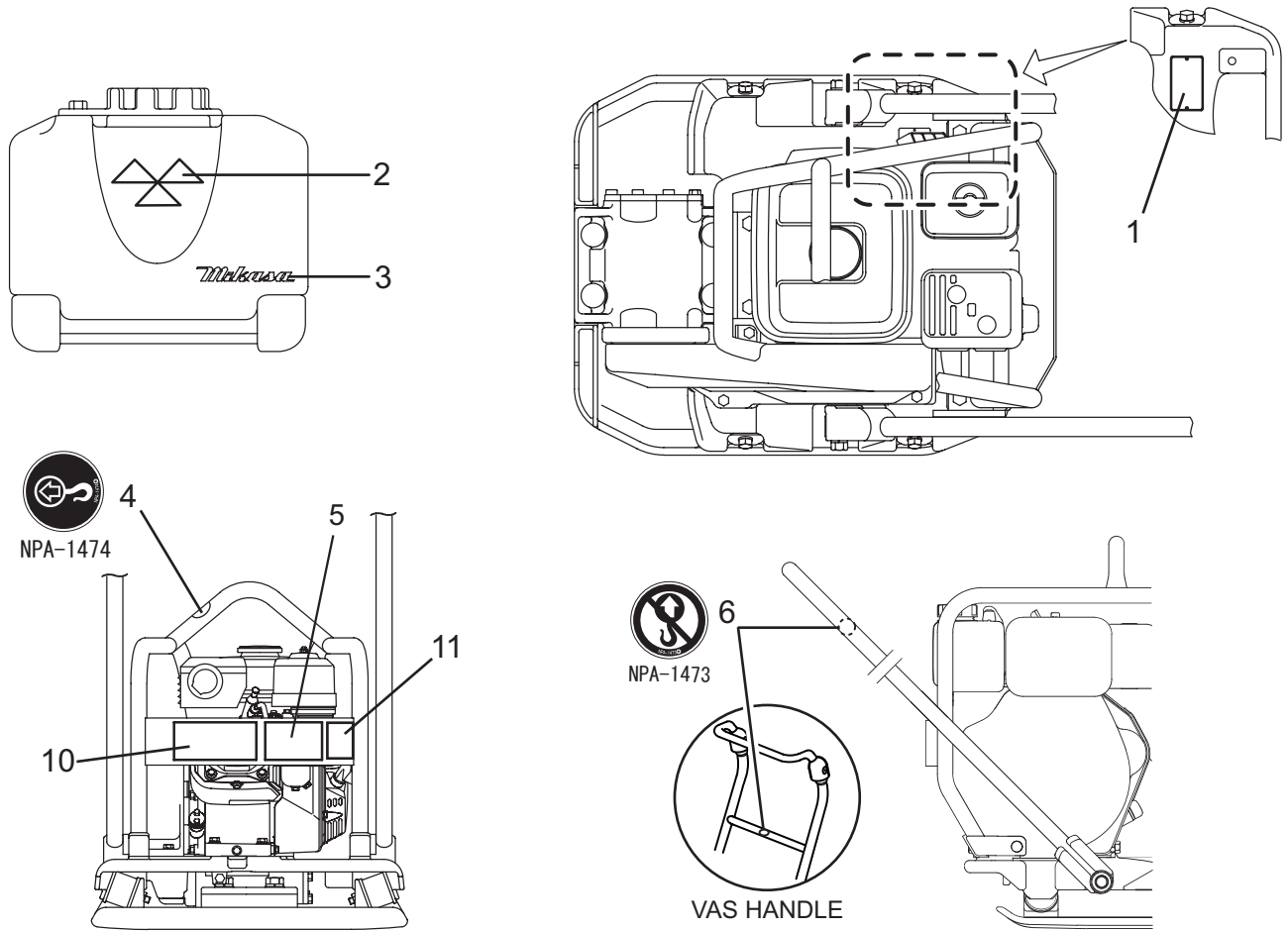
MVC-F60/F70/F80/F82



MVC-88GE/88GH



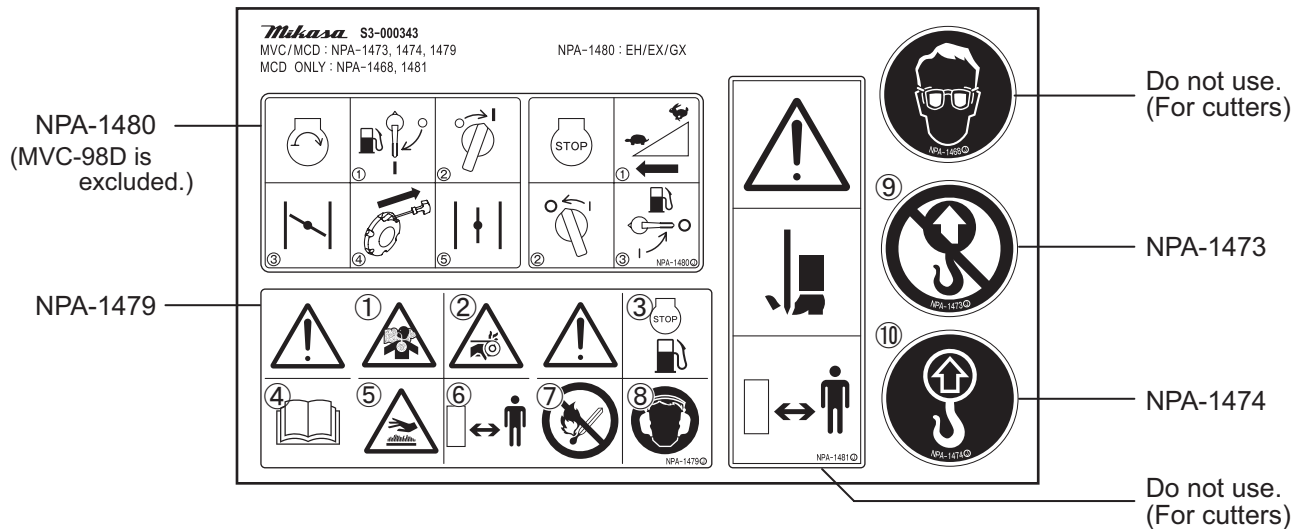
MVC-98D



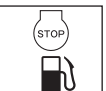


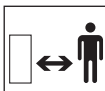






REF No.	PART No.	PART NAME	Q' TY	LABEL No.	REMARK	
1	_____	PLATE, SERIAL NO. / EU	1	_____		
2	9201-01410	DECAL, MIKASA MARK 120X60	1	NP-141		WATER TANK
3	9201-05070	DECAL,MIKASA MARK 125MM	1	NP-507		WATER TANK
4	9209-00090	DEAL,LIFTING POSITION	1	NPA-1474		
5	9209-00090	DEAL,CAUTION ICONS	1	NPA-1479		Warnig labels
6	9209-00090	DECAL,DO NOT LIFTING	1	NPA-1473		
7	9202-00870	DECAL, WITHOUT ENGINE OIL	1	NPA-87	F60-F82	
8	9202-10330	DECAL,EC NOISE REQ.LWA105	1	NPA-1033	98D is excluded	
9	9209-00090	DECAL,ENGINE HANDLING /GS	1	NPA-1480	98D is excluded	Starting, and stopping
10	9202-08450	DECAL,LIFTING POSITION	1	NPA-845	88GE/88GH/98D	
11	9202-10100	DECAL,EC NOISE REQ.LWA108	1	NPA-1010	98D	

4-10. Descriptions of symbols used on warning labels

P/N 9209-00090 DECAL, SET /MVC, MCD /EXP,EU (NPA-1479, 1473, 1474)



- | | |
|---|---|
| <p>①  Danger: poisonous exhaust gas
Carbon monoxide poisoning may occur if the exhaust gas is inhaled. Do not operate the machine in a poorly ventilated area.</p> <p>②  Be careful not to get caught in the rotating parts.
During operation, be careful not to have your fingers, body, clothes, etc. come in contact with the rotating parts such as the V-belt and clutch.</p> <p>③  Refueling Hazard.
Don't fill the fuel tank while the engine is running or hot.</p> <p>④  Read the manual carefully.
Always read the operation manual and have good understanding of operation before your work.</p> <p>⑤  Be careful not to get burned.
Accidental burn may occur if you touch the hot parts (engine, muffler, etc.) during operation or immediately after the machine stops.</p> | <p>⑥  Be careful not to approach danger source.
During operation, Be careful not to approach hot parts and rotating parts.</p> <p>⑦  Fire hazard
Stop the engine when refueling. Fire may occur if a flame is near the tank fuel port.</p> <p>⑧  Danger of hearing damage caused by noise
Always use ear plugs while operating the machine.</p> <p>⑨  Lifting by the handle is prohibited.
Due to a falling risk, do not lift the machine by the handle.</p> <p>⑩  Lifting position.
For lifting, use only one point hoisting hook, and do not lift at any other part.</p> |
|---|---|

Starting, and stopping (Refer to engine instruction manual for MVC-98D.)

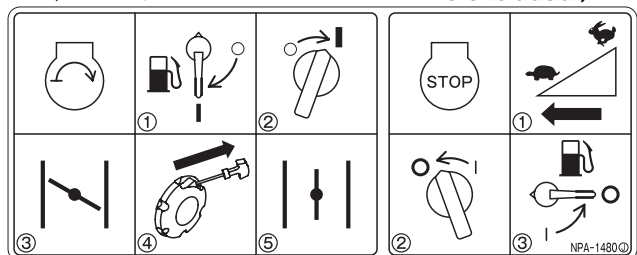
P/N 9209-00090 DECAL, SET /MVC, MCD /EXP, EU (NPA-1480 : MVC-98D is excluded.)

START

- Open Fuel Cock to start
- Turn Stop Switch to "I"(ON) position
- Close Choke Lever
- Pull Recoil Starter to start
- Return Choke Lever to open

STOP

- Return Throttle Lever fully until "O"(OFF) position to stop work
- After cooling down enough, stop the engine to move Stop Switch to "O"(OFF) position
- Close Fuel Cock at the end



5. Specifications

5.1 Machine Specifications

Model	MVC-F60R (VAS)	MVC-F60H (VAS)	MVC-F70R	MVC-F70H	MVC-F80R (VAS)	MVC-F80H (VAS)
Model	Robin EX13D	Honda GX120	Robin EX17D	Honda GX160	Robin EX17D	Honda GX160
Overall Length mm	905		905		915 (930)	
Overall Width mm	350		420		450	
Overall Height mm	860		860		860 (1000)	
Plate Size (W X L) mm	350 x 510		420 x 510		450 x 570	
Operating Weight kg	74 (79)	73 (78)	81		87 (90)	
Travelling Speed m/min	25		25		25	
Vibrating Frequency Hz(vpm)	93 (5600)		93 (5600)		93 (5600)	
Centrifugal Force kN(kgf)	10.1 (1030)		12.0 (1220)		13.7 (1400)	
Vibrating unit	SAE 10W-30		SAE 10W-30		SAE 10W-30	
Lubrication oil in vibration case cc	140		140		140	
Water Tank Capacity liters	11		11		13	
V-Belt Size	RPF3310		RPF3310		RPF3310	

Model	MVC-F82R VAS	MVC-F82H VAS	MVC-88GE (VAS)	MVC-88GH (VAS)	MVC-98D (VAS)
Model	Robin EX17D	Honda GX160	Robin EX17D	Honda GX160	Yanmar L48N6VMK
Overall Length mm	970		1100 (1050)		1100 (1050)
Overall Width mm	450		500		500
Overall Height mm	965		825 (950)		825 (950)
Plate Size (W X L) mm	450 x 570		500 x 525		500 x 525
Operating Weight kg	90		96 (99)		108 (111)
Travelling Speed m/min	25		25		25
Vibrating Frequency Hz(vpm)	93 (5600)		100 (6000)		100 (6000)
Centrifugal Force kN(kgf)	13.7 (1400)		15.0 (1530)		15.0 (1530)
Vibrating unit	SAE 10W-30		SAE 10W-30		SAE 10W-30
Lubrication oil in vibration case cc	140		200		200
Water tank capacity liters	11		13		13
V-Belt Size	RPF3310		RPF3330		RPF3380

Remarks: VAS = Vibration Absorbing System

5.2 Engine Specifications

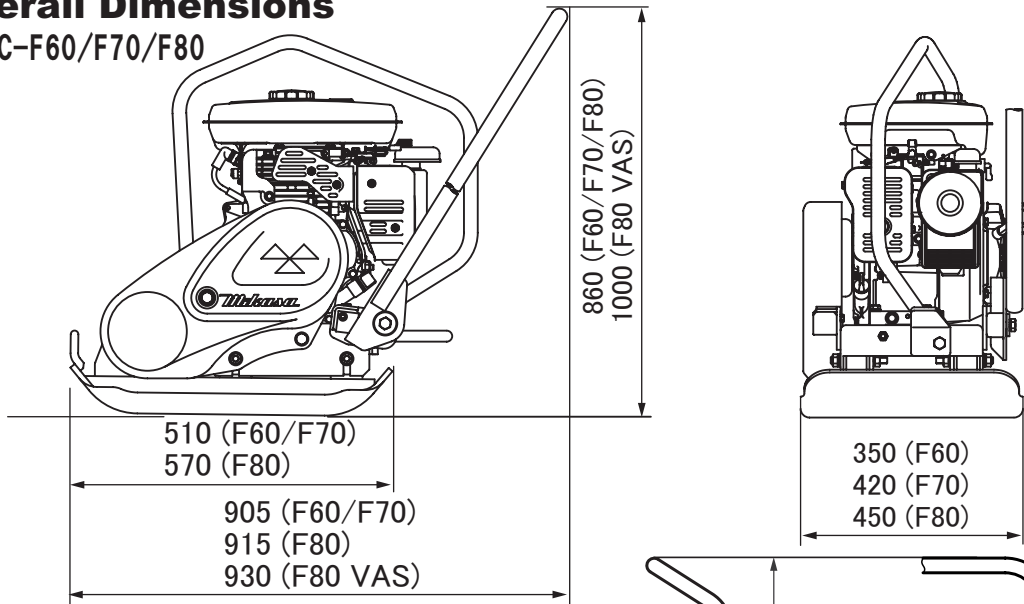
Manufacturer	Robin	Honda	Robin	Honda	Yanmar
Model	EX13D (petrol)	GX120 (petrol)	EX17D (petrol)	GX160 (petrol)	L48N6VMK (diesel)
Max. Output	3.2kW(4.3PS) /4000min ⁻¹	2.6kW(3.5PS) /4000min ⁻¹	4.2kW(5.7PS) /4000min ⁻¹	3.6kW(4.9PS) /4000min ⁻¹	3.5kW(4.7PS) /3600min ⁻¹
Fuel Tank Capacity liters	2.7	2.5	3.6	3.6	2.4
Lubricant capacity cc	600	600	600	600	800
Starting system	Recoil starting	Recoil starting	Recoil starting	Recoil starting	Recoil starting
Set R.P.M rpm	3600	3600	3600	3600	3600

(The specifications may be changed without notice)

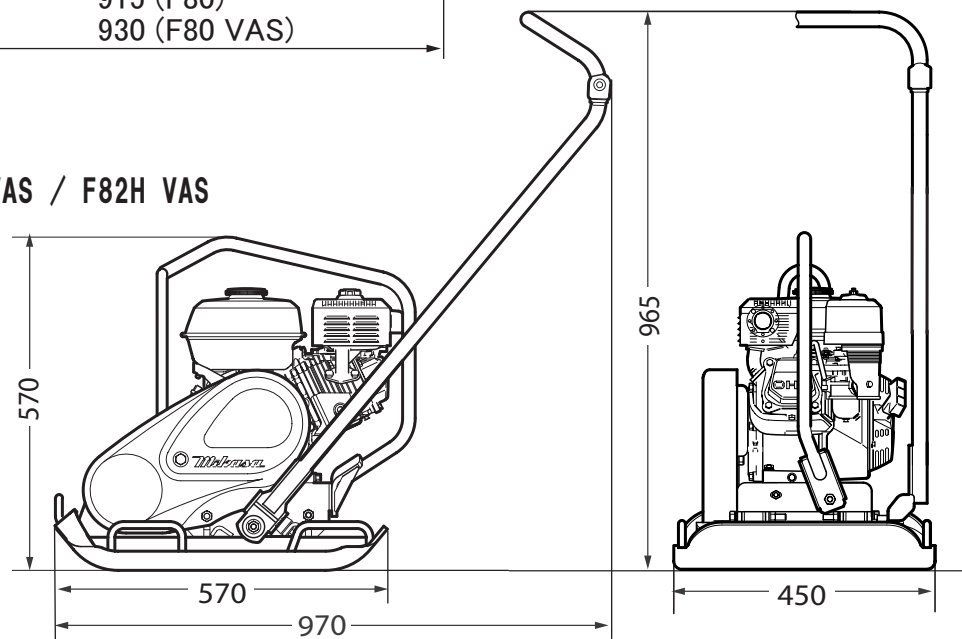
6. Appearance

6.1 Overall Dimensions

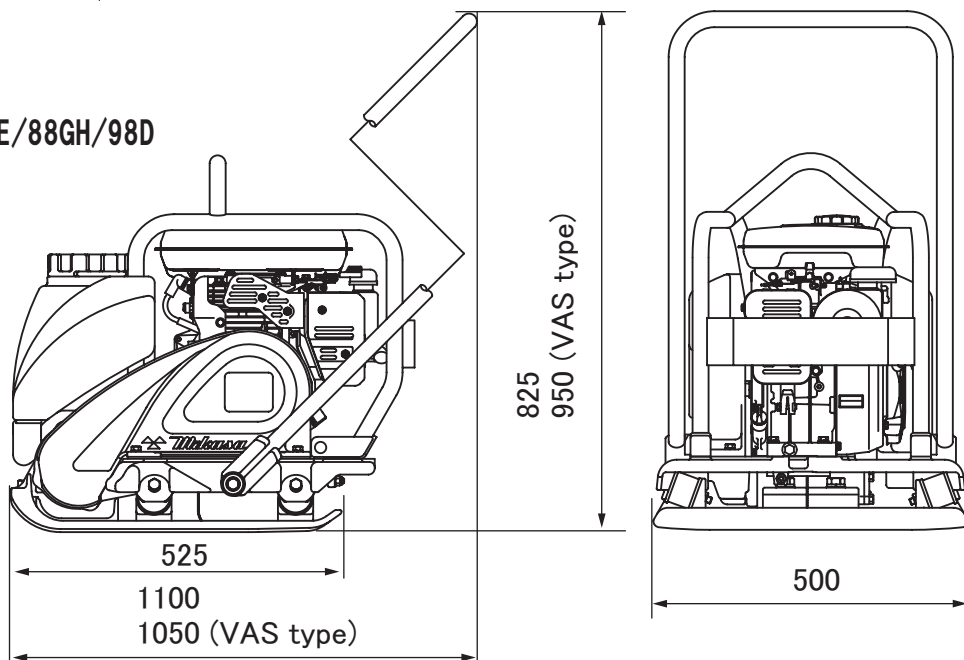
6.1.1 MVC-F60/F70/F80



6.1.2 MVC-F82R VAS / F82H VAS

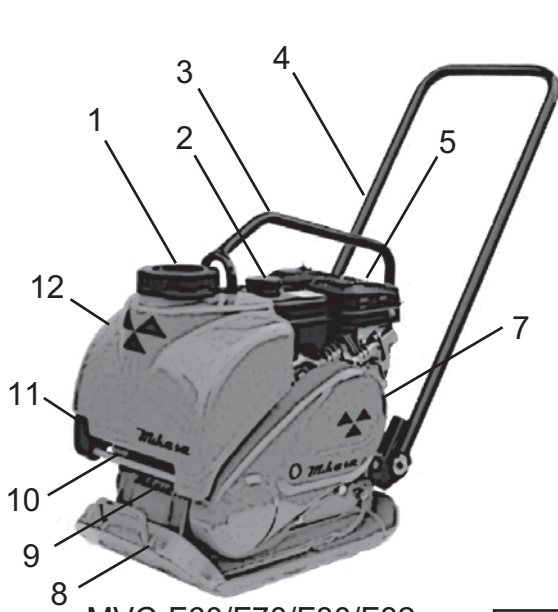


6.1.3 MVC-88GE/88GH/98D



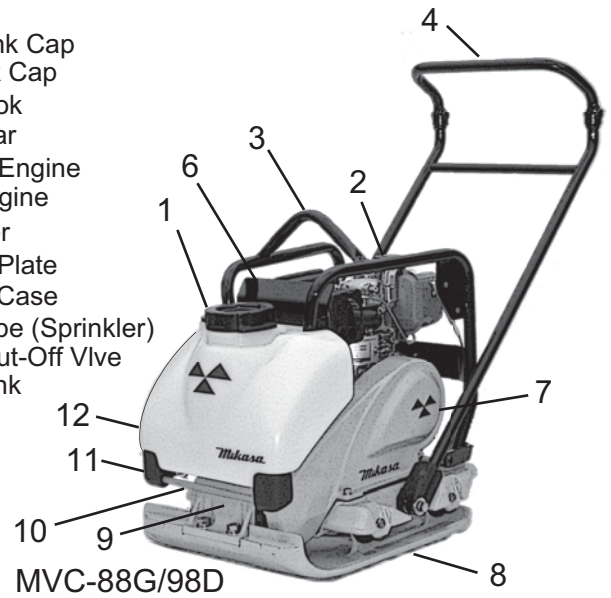
Dimensions may change without notice.

6.2 Control Unit Positions and Names



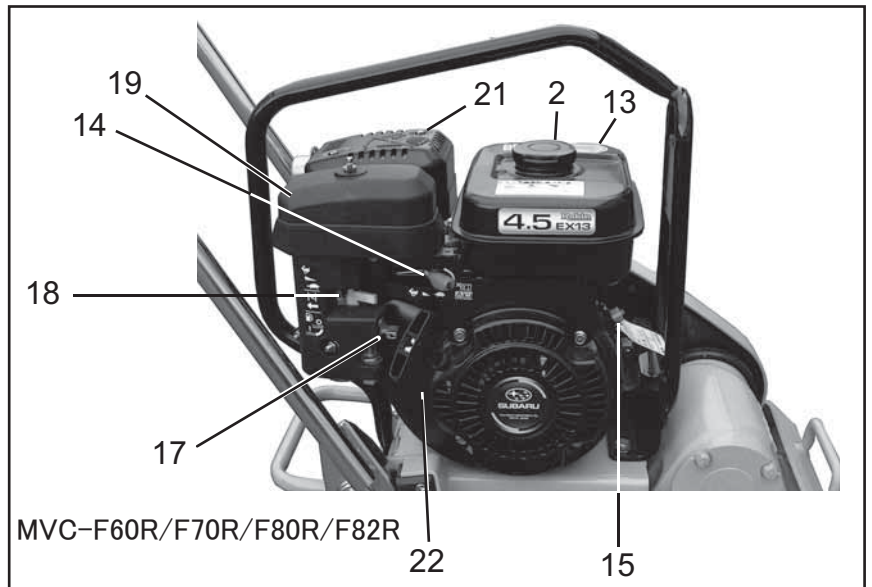
MVC-F60/F70/F80/F82

1. Water Tank Cap
2. Fuel Tank Cap
3. Lifting Hook
4. Handle Bar
5. Gasoline Engine
6. Diesel Engine
7. Belt Cover
8. Vibrating Plate
9. Vibration Case
10. Water Tube (Sprinkler)
11. Water Shut-Off Valve
12. Water Tank

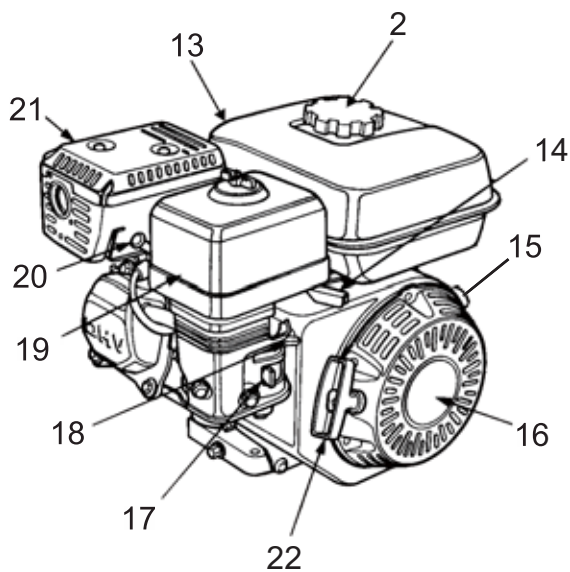


MVC-88G/98D

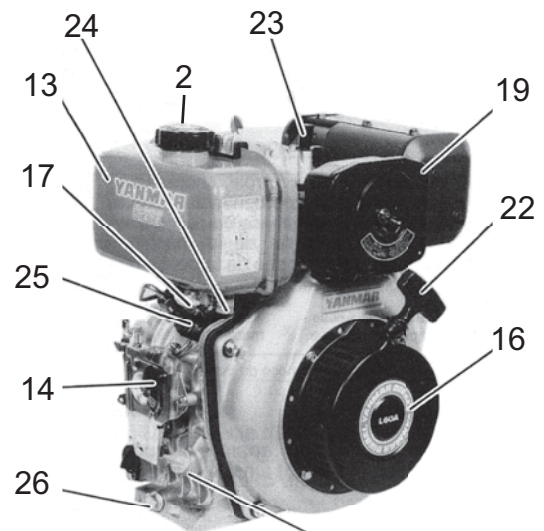
13. Fuel Tank
14. Throttle Lever
15. Engine ON/OFF Switch
16. Recoil Starter (pullrope)
17. Fuel Valve Lever
18. Choke Lever
19. Air Cleaner
20. Spark Plug
21. Muffler
22. Starter Grip
23. Rubber Plug
24. F.O. Drain Plug
25. Fuel injection pump
26. L.O. Drain plug
27. Oil Filler Cap / Dipstick



MVC-F60R/F70R/F80R/F82R



MVC-F60H/F70H/F80H/F82H/88GH



MVC-98D

27

7. Inspection Before Operation

⚠ DANGER

Conduct inspection while the engine is stopped. If you get caught in the rotating parts, you may suffer serious damage. Conduct inspection after making this machine level and checking that the body does not move.

Refer to the "Regular Check and Adjustments" on page 17 for the inspection points before starting operation.

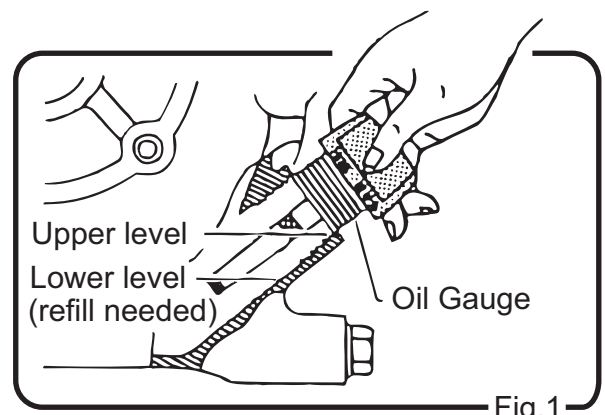
- 1 Clean each part of the machine well to maintain dirt and dust-free condition. Pay special attention to the soil adhered to the bottom of the vibrating plate, engine cooling air inlet, and the carburetor and air cleaner area to keep those parts clean.
- 2 Check each part for any looseness of bolts. Vibration causes bolts & nuts to loosen, which might result in unexpected accident or malfunction.
- 3 Inspect the guard hook, belt cover and anti-vibration rubber, as well as to check the function of speed adjustment wire and speed adjusting lever.
- 4 Check V-belt tension. The belt should have about 10 – 15mm of flexibility when pushed strongly with a finger at the mid-point between the axes. If V-belt is loosened, power is not transmitted well, which reduces compacting force and shortens the life of V-belt. In addition, the generated compaction force will lead to irregular vibrations when the engine revolutions are increased, and may result in a machine failure.
- 5 Set the engine on a level surface to check the oil level. If the oil level is low, add oil.

Quality: Diesel engine oil, Grade CC or above

Gasoline engine oil, Grade SE or above

**Viscosity: SAE No. 30 at 20°C and above (summer)
SAE10W-30**

Temperature	Use oil
More than 25	SAE#30
10 ~ 25	SAE#30, #20
10 ~ 0	SAE#20
Less than 0	SAE#10



- 6 Set the machine on a level surface, then remove the oil gauge of the vibrator. Check the oil gauge to see if the oil is at the specified level. Use engine oil SAE10W-30 as lubrication oil.
 Recommended oil quantity for MVC-F60/F70/F80/F82 is 140cc and MVC-88/98D, 200cc.
 Remove the oil plug in Vibrator Assembly and check the oil level. Make sure the oil quantity is set at level of plug hole for checking. Every month or every 200 hours of operation, replace the oil.

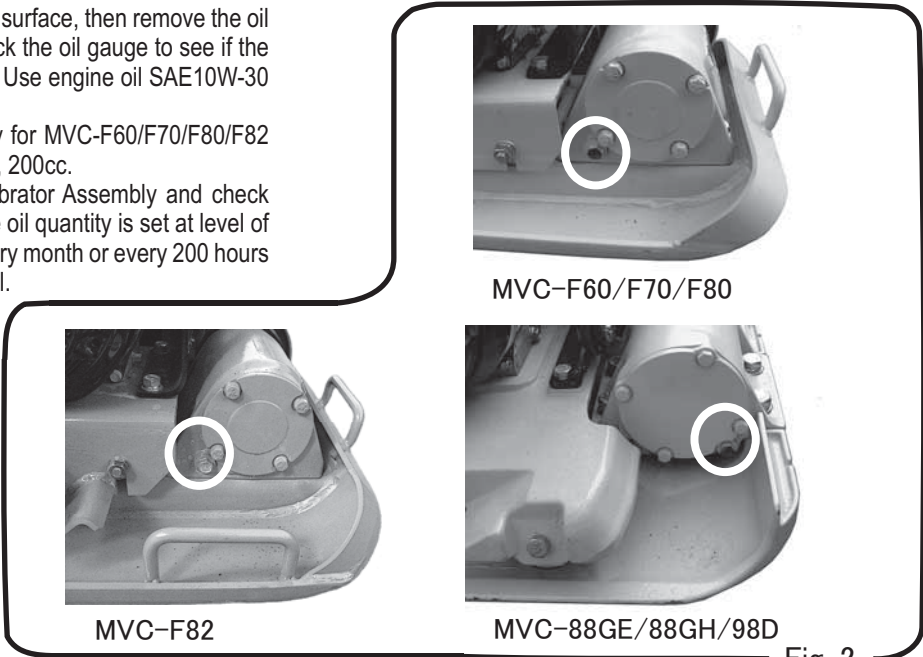


Fig. 2

- 7 A regular grade gasoline or diesel oil should be used in the engine. When filling the fuel tank, make sure the fuel filter is used.

⚠ DANGER

Never refuel this machine while leaving the engine running. There is danger of fire.

⚠ DANGER

Never smoke, or put other flames close to this machine while refueling. Serious hazards such as burns and fire may result.

⚠ DANGER

Choose a place free from flammable substances for refueling. Be careful not to spill fuel. In case fuel should be spilled, wipe off the spilled fuel completely.



- 8 Pour water into the water tank for sprinkling work.

Note: Pour water only. If you should put liquids other than water, the resin, tank cap seal, etc. may deteriorate or swell, leading to leakage or damage.

The water tank can be removed by pulling it upward. When mounting the water tank again, insert the hook into the groove of the water tank securely. The amount of sprinkling water can be adjusted by the cock.

8. Operation

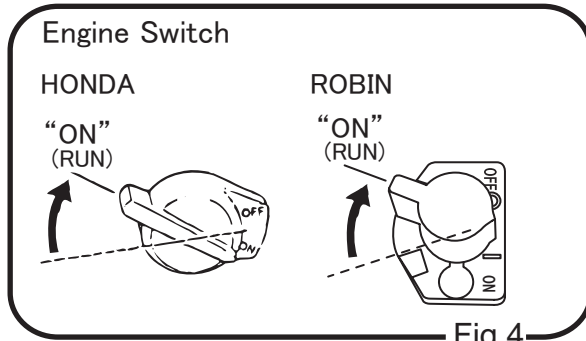
8.1 Starting



The engine exhaust gas contains carbon dioxide and is very dangerous.
Do not use this machine where ventilation is poor.

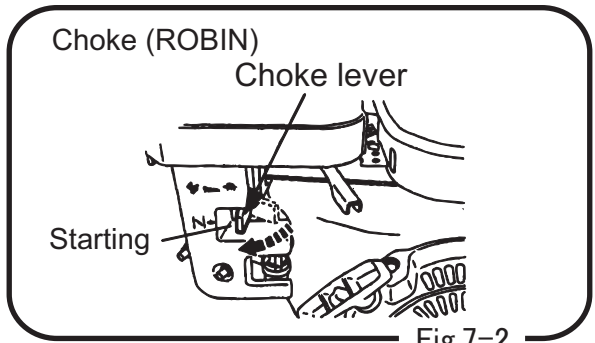
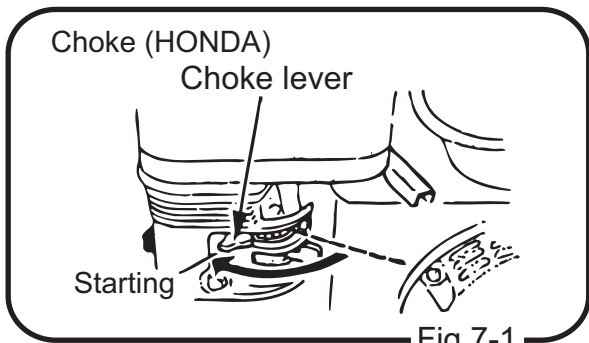
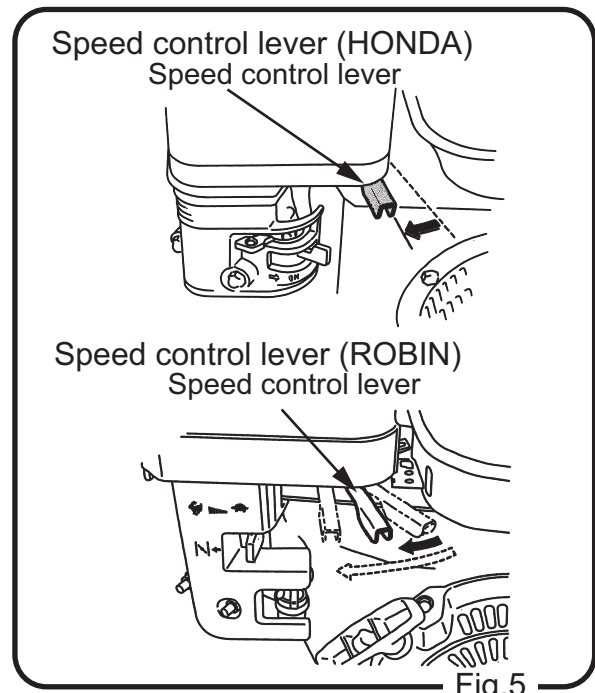
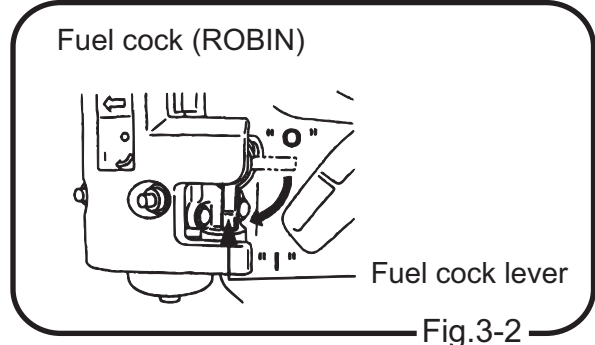
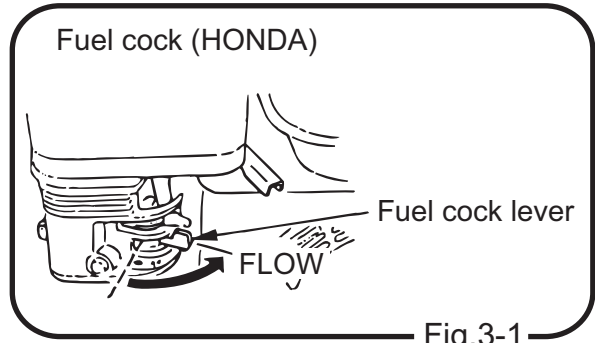
Gasoline engine

- 1 Turn the lever of the fuel cock downward and feed fuel. (Figs.3-1 & 3-2)
- 2 Turn the stop switch to "ON (I)" position. (Fig.4)



- 3 Open the speed control lever half. (Fig.5)

When it is cold or the engine does not start easily, close the choke lever. (Figs. 7-1 & 7-2)



- 4 Grip the starting knob of the recoil starter. When you pull the rope a little, you will feel some resistance. Then pull it at a stroke. Be careful not to pull the rope too strongly, or the rope may break or come off. (Fig.8-1 & 8-2)

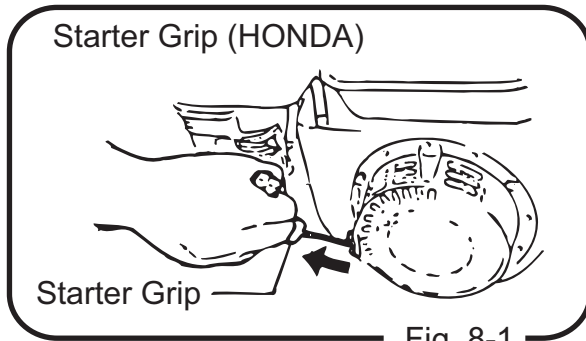


Fig. 8-1

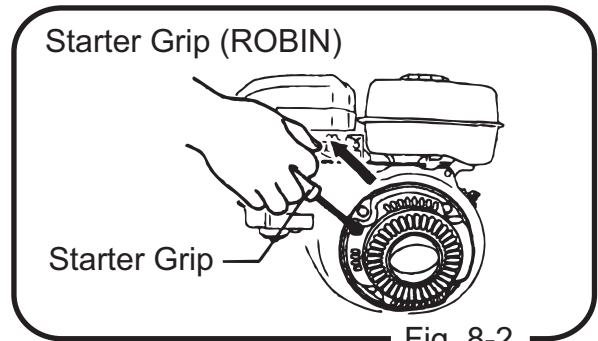


Fig. 8-2

- 5 When the engine has started, return the speed control lever to the low speed position immediately. Listening to the sound of the explosion, return the choke lever gradually to the fully open condition. (Fig.9-1 & 9-2)

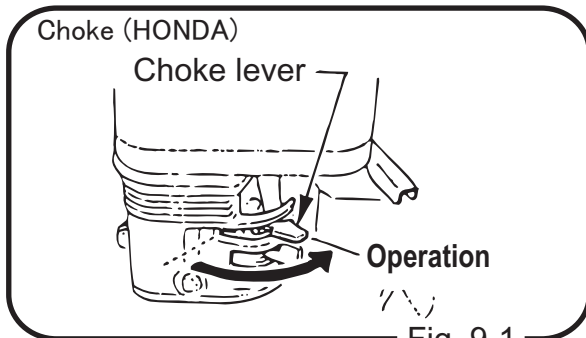


Fig. 9-1

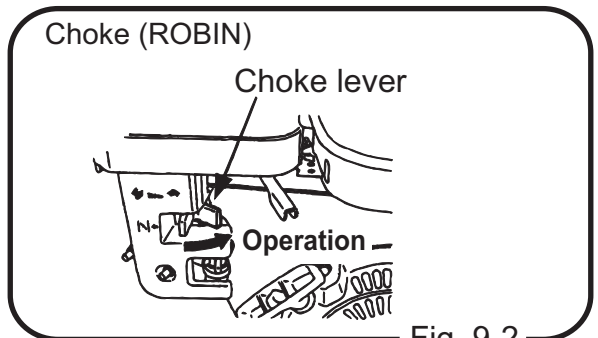


Fig. 9-2

After the start, be sure to conduct the warm-up operation at low speed for 2-5 minutes. This is particularly important when it is cold. During this time, check for any abnormalities such as gas leakage.

- **Note:** If you leave the speed control lever half-open, the centrifugal clutch turns into a slipped state. This may cause a failure of the centrifugal clutch, and also cause abnormal vibration of this machine, which is very dangerous. So, as soon as the engine has started, return the speed control lever to the low-speed position.

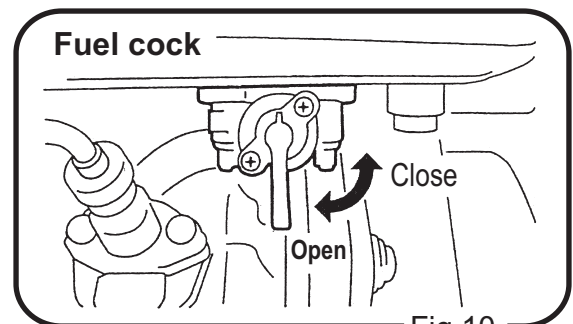


Fig.10

Diesel engine

- 1 Open the fuel cock lever. (Fig 10)
- 2 Open the speed control lever to about 30° for the idling position. (Fig.11)

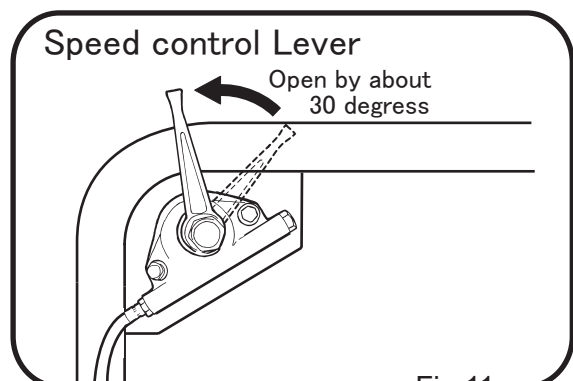


Fig.11

Diesel engine

3 The engine is started in the manner described below. Pull out the recoil starting handle.

- ① Pull out the handle to the point where you feel strong resistance, and then return it to the initial position.
- ② Push down the decompression lever. It will return automatically when the recoil starter is pulled.
- ③ Pull out the recoil starting handle briskly with both hands.
(See the illustration.)

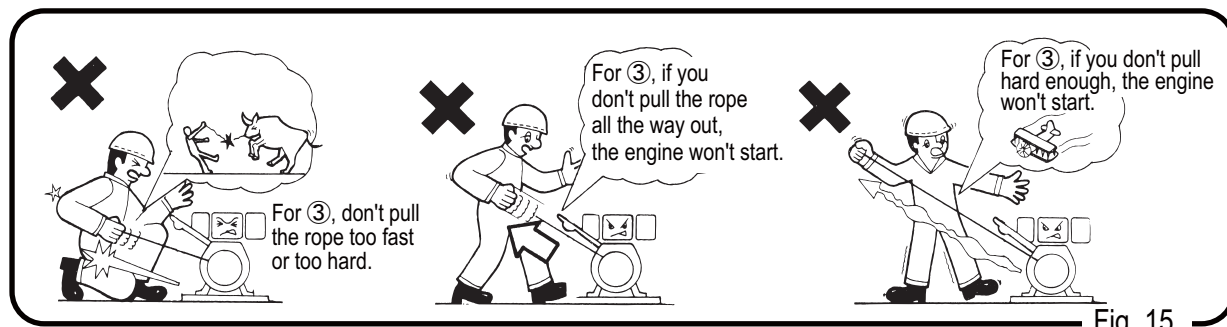
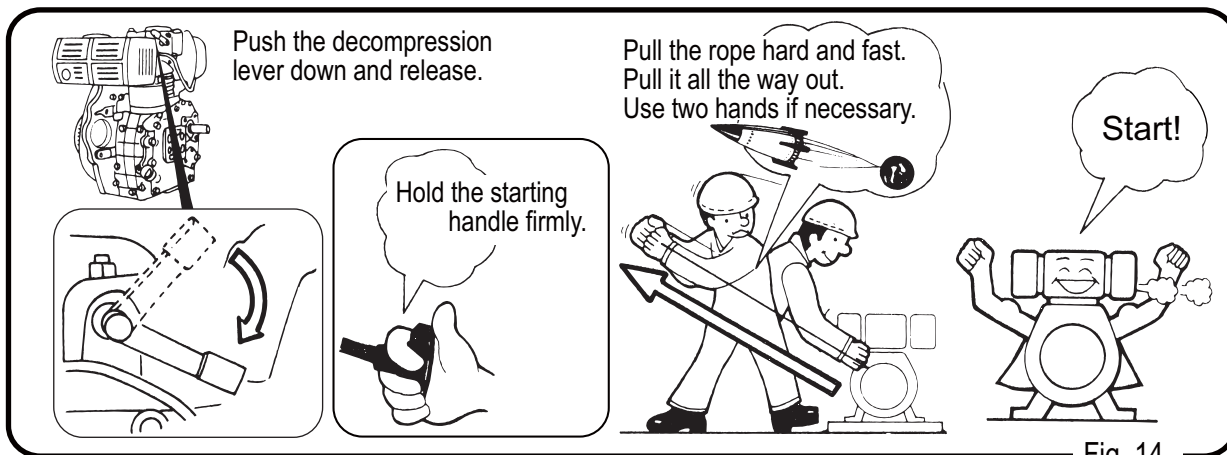
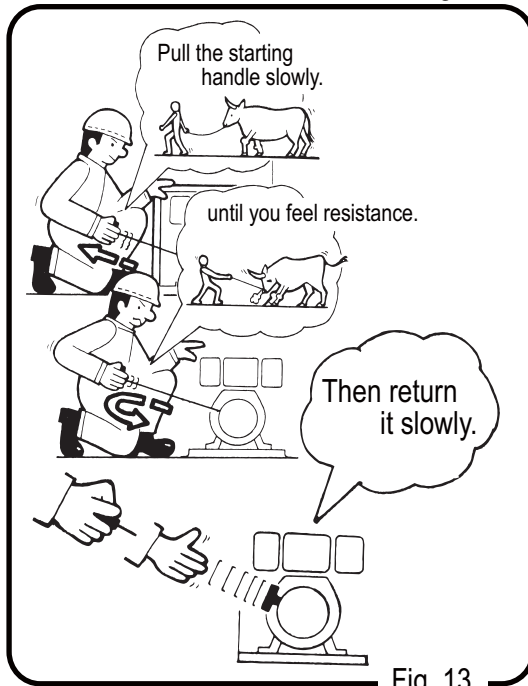
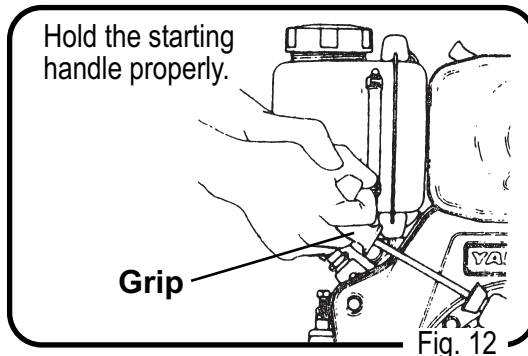
⚠ CAUTION

Do not allow the handle grip to snap back against the engine. Return it gently to prevent damage to the starter.

⚠ WARNING

Never use any cold starting aids such like gasoline and other volatile liquid. Severe damage to the engine will occur.

- 4 After the start, be sure to conduct the warm-up operation at low speed for 2-5 minutes. This is particularly important when it is cold. During this time, check for any abnormalities, such as gas leakage.



8.2 Operation

- 1 If you open the speed control lever at a stroke, this machine starts vibration and moves forward. If you open it slowly, the clutch may slip, so open the speed control lever at a stroke without hesitation. (Figs. 5 & 11)
- 2 When this machine is used on cohesive soils, the vibrating plate does not move over the ground easily and the travel speed becomes slow. Check that clay is not adhering to the bottom of the compaction board. The compaction force of this machine does not act effectively on cohesive soils or soils of a high moisture ratio. In this case, use other machine such as a rammer, or dry the soils and decrease the moisture ratio.
- 3 When conducting sprinkling work, open the cock of the water tank.
- 4 When you stop the operation, return the speed control lever at a stroke.

9. Stopping Machine

- 1 When you finish the work and stop the engine, return the speed control lever to the low speed position, and keep the engine running at low speed for 3-5minutes. When the temperature of the engine has decreased, stop the engine.

CAUTION

If you stop the engine while it is still hot, this machine will be affected adversely, causing, for example, burning of the oil film on the inner wall of the cylinder, which may accelerate wear of the inner wall of the cylinder. This may result in a shorter life of this machine, or cause unexpected failure.

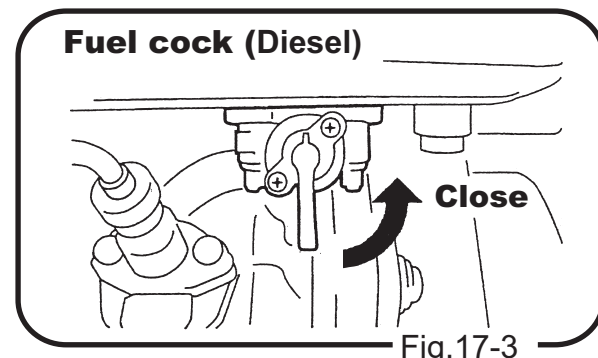
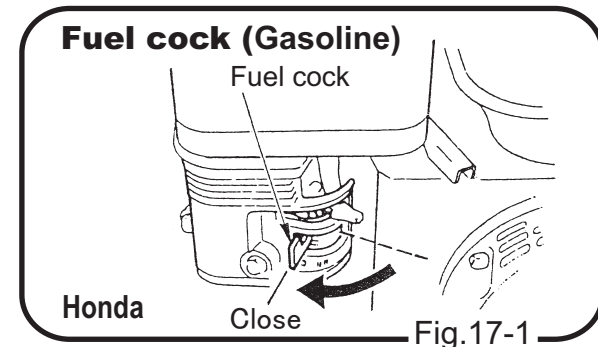
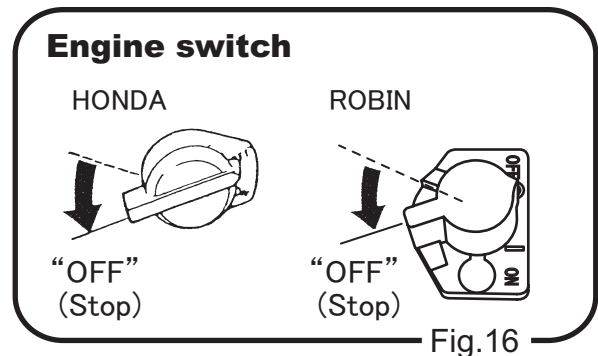
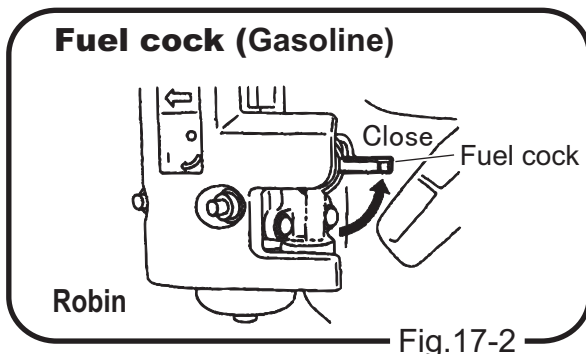
Diesel engine

Move the speed control lever to the stop position to stop the engine.

Gasoline engine

Turn the engine switch to the OFF position, then the engine stops. (Fig. 16)

- 2 Close the lever of the fuel cock. (Fig. 17-1 & 17-2 & 17-3)



- 3 When you have conducted sprinkling work, close the cock of the water tank.

10 Transportation

WARNING	<ul style="list-style-type: none">● Make sure there is no breakage of guard frame and anti-vibration rubber nor loosened or missing bolts.● Always stop the engine when lifting.● Use an intact wire rope without any deformation with sufficient strength.● Slowly lift upward without applying any impact. Never let people or animals go under the lifted machine.● For safety reasons, do not lift to a height that is higher than necessary.	
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10.1 Loading and Unloading

For loading and unloading using a crane, an operator qualified for cranes and hooking works is needed.

- 1 Use a crane for loading and unloading the machine.
- 2 Designate a person to guide the loading and unloading, and always work under the instruction of that person.
- 3 When lifting, always use a special hook on the guard frame. (Fig. 18)
Never lift by using the hook on the handle.

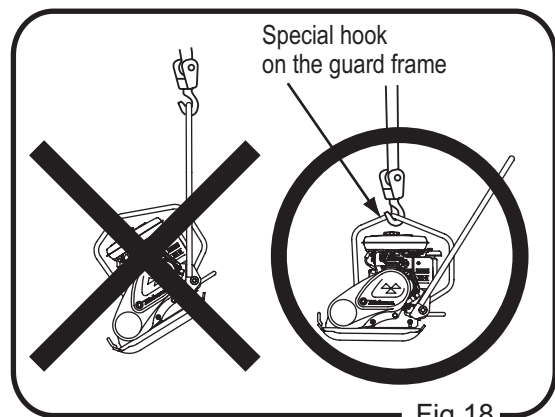


Fig.18

10.2 Transportation Precautions

WARNING	<ul style="list-style-type: none">● Stop the engine when the machine is transported.● Always drain the fuel before transportation.● Fix the machine securely to prevent the machine from moving or falling.	
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11 Storage

- 1 Wash with water to remove any dust and dirt from all parts of the machine.
- 2 Store in a dry area away from direct sunlight after putting the cover over the machine to prevent dust and dirt buildup.

(When storing this machine for an extended period of time)

- 3 Drain the fuel from the fuel tank, fuel pipe, and carburetor completely.
- 4 Conduct fueling and replenishment/change of oil without omission. Remove the spark plug, put a few drops of engine oil into the cylinder, and rotate the engine manually for spreading the oil inside sufficiently.
- 5 Securely cover the air cleaner and muffler air inlets and exhaust port.
- 6 Do not leave the machine outdoors. Keep it indoors.
- 7 Do not store this machine by laying it on its side (or backward).

12. Regular Check and Adjustments

12.1 Inspection and Maintenance Schedule Table

Check frequency	Check parts	Check items	Oils
Daily (before starting)	Appearance	Flaw, deformation	
	Fuel tank	Leakage	
	Fuel system	Leakage	
	Engine oil	Leakage, oil level, dirt	Engine oil
	Shock absorber	Crack, damage, wear	
	Vibrator oil	Leakage	Engine oil
	Air cleaner element	Dust, deformation	
	Guard frame	Breakage, flaw, loosened or missing bolts and nuts	
Every 20 hours	Bolts and nuts	Looseness, missing	
	Engine oil	Replace only after the first 20 hours	Engine oil
Every 100 hours	Engine oil filter (Diesel)	Replace only after the first 20 hours	
	Engine oil	Change	Engine oil
	Engine oil filter	Washing	
Every 200 hours	Vibrator oil	Leakage, oil level, dirt	Engine oil
	V-belt for vibrator	Flaw, tension	
	Clutch	Dirt, flaw, wear	
Every 300 hours	Engine bolt	Wear, deformation, degradation	
	Vibrator oil	Change	Engine oil
	Fuel filter	Change	
Every 2 years	Engine oil filter (Diesel)	Change	
	Fuel pipes	Change	
As necessary in time	Air cleaner element	Change	

For details about the check and maintenance of the engine, please refer to the attached engine operation manual.

Caution:

The above table shows the check frequency for standard condition.

The check frequency may vary depending on the condition in which the machine is used.

For check of bolt and nut looseness and tightening, please see the following tightening torque list.

Tightening Torque List (unit: kgf-cm, 1kgf-cm=9.80665N-cm)

		Thread diameter							
		6mm	8mm	10mm	12mm	14mm	16mm	18mm	20mm
Material	4T(SS41)	70	150	300	500	750	1,100	1,400	2,000
	6-8T(S45C)	100	250	500	800	1,300	2,000	2,700	3,800
	11T(SCM3)	150	400	800	1,200	2,000	2,900	4,200	5,600
	When the mating material is aluminum.	100	300~350	650~700	(Bolts used on the machine are all right-hand thread.)				

12.2 Changing Engine Oil

Perform the first engine oil change after 20 hours of operation, then change at every 100 hours.

12.3 Cleaning Air Cleaner

When the air cleaner element becomes dirty, the engine does not start smoothly, and sufficient output cannot be obtained. Machine operation will be affected and the engine life will be shortened greatly. Do not forget to clean the element. (For details, please see the separate engine operation manual.) If the element cannot be cleaned, replace it with a new one.

12.4 Checking/Changing V-belt and Clutch

1 Checking V-belt

Remove the belt cover and check that V-belt is properly stretched every 200 hours. Press on the portion midway between the two shafts with your fingers strongly. The belt is properly stretched if that portion bows by about 10-15 mm.

2 Checking the clutch

Inspect Clutch concurrently with the inspection of V-belt. Check visually for burning of each clutch-shoe. Check for wear the lining shoe or the like, in the operation check. If the shoe wears, power transmission is not performed properly and Clutch slips. Check wear or any damage to V-groove also. If V-groove is stained, clean it thoroughly.

3 Checking Bolt, Engine

The part of Bolt, Engine is made of rubber material, of which the inferiority like fatigue or worn leads V-belt tension low. Whenever checking V-belt, inspect this part for the reason as well as Shock Absorbing Rubber. (Fig.20)



When the vibration weakens during operation, or this machine does not vibrate at all though the engine rotates normally, conduct the inspection or change of the V-belt and clutch without regard to the regular inspection of every 200 hours.

12.5 Inspection and Change of Vibrator Oil

Make this machine level, and remove the oil level plug off the vibrator. Check that vibrator oil is provided up to the mouth level. The oil level plug is on the right side of the vibrator case (opposite to the belt side). (Refer to Fig.1 on page 10.)

Use the engine oil #10W-30 for vibrator oil. Refer to page 7 for the amount. Drain the vibrator oil completely by removing the plug and tilting the body once a month or every 200 hours' operation. Replace with new oil.

12.6 Inspection and Change of Engine Bolt

Replace immediately when it was found the wear, deformation or degradation of elastic rubber material, which may cause V-belt come off or the engine to vibration damage directly and excessively. (Fig.20)



Fig.19



Always stop the engine before inspection and adjustment. If you are caught in a rotating part, serious injury might occur.

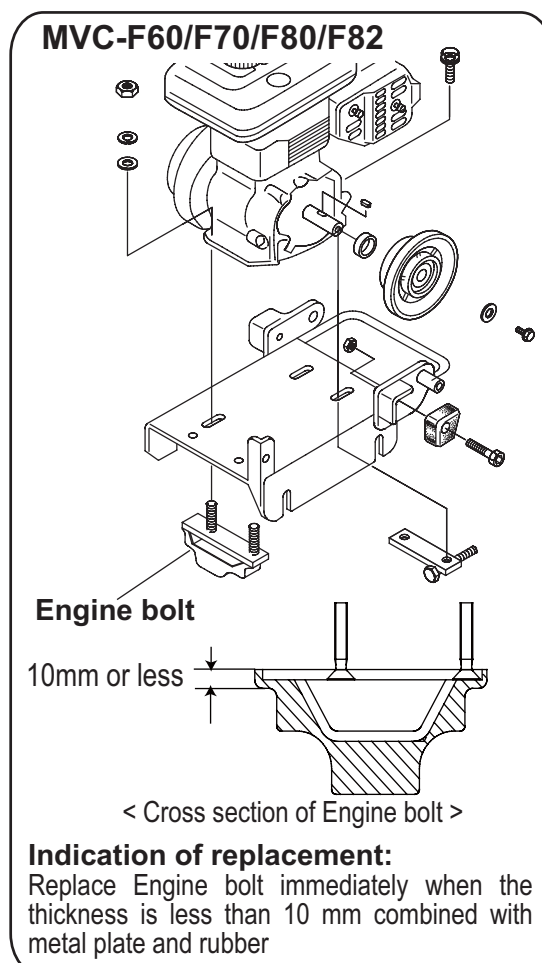
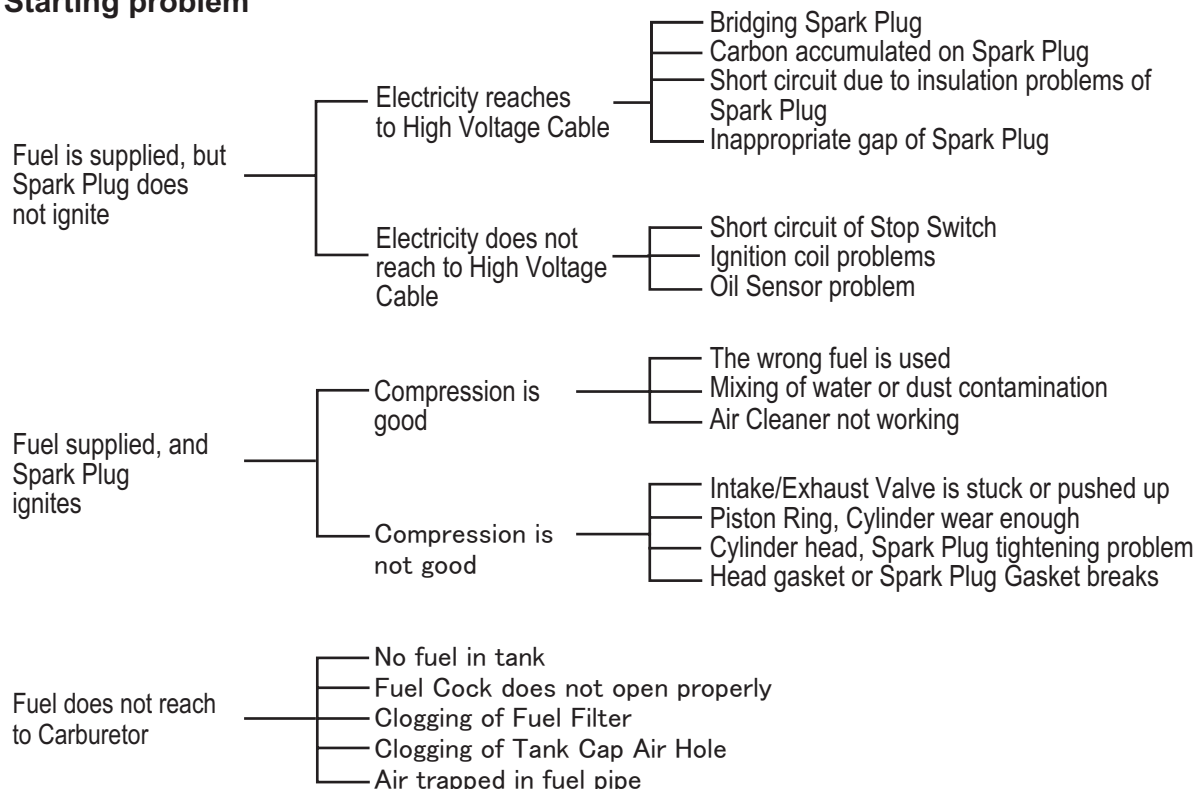


Fig.20

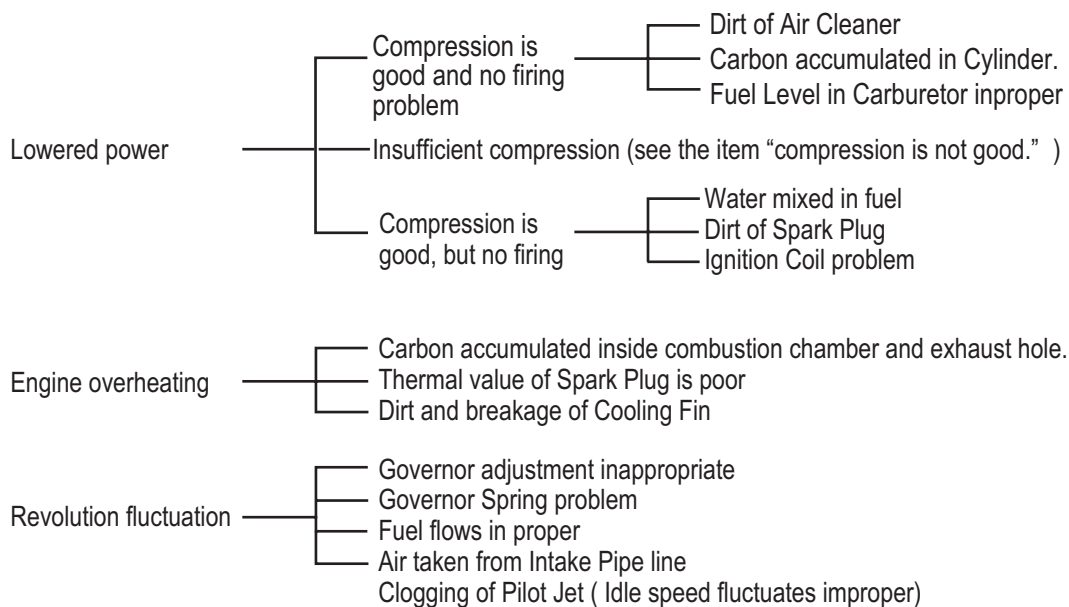
13. Troubleshooting

1. Gasoline Engine

(1) Starting problem



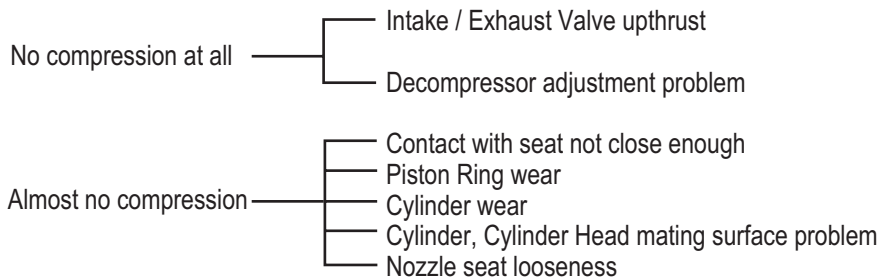
(2) Operation problem



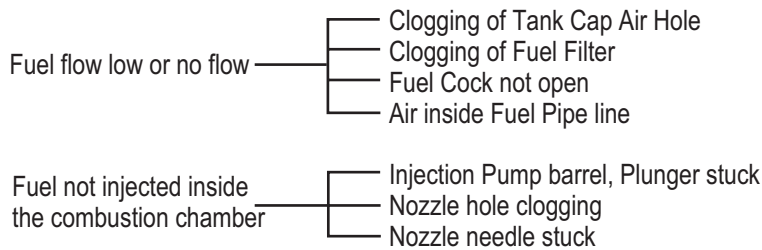
2. Diesel Engine

(1) Starting problem

(A) In case of compression problem



(B) In case of inappropriate fuel injection inside the combustion chamber



No fuel in Fuel Tank

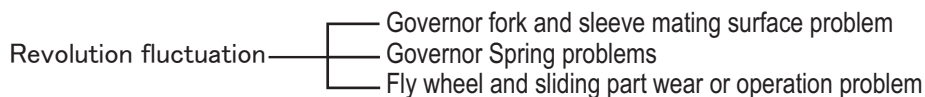
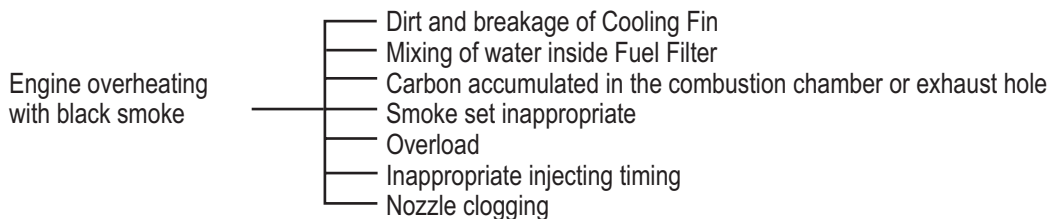
Mixing of water or dust

(C) Fuel and compression pressure appropriate, but engine does not start



(2) Insufficient output and operation problems

Insufficient compression ————— See the comment for insufficient compression



Engine revolution does not increase ——— Valve open/close timing inappropriate
Clogged exhaust hole, muffler
Overload

Firing problem with white smoke (when unloaded) ——— Piston, Cylinder Ring wear
Nozzle hole clogging
Piston Ring stuck
Wrong assembly (upside down) of Piston Ring
Inappropriate injection timing
Inappropriate Valve open/close timing
Looseness of Injection Pump joint

Fuel consumption too high (black smoke) ——— Leakage from fuel passage
Clogging of the Air Cleaner Element
Inappropriate fuel due to mixing of impurities
Overload

Extensive wear on sliding parts or stuck piston rings ——— Use of wrong oil
Failure to change oil
Breakage of the Air Cleaner Element or failure to clean Air Cleaner

Stopped suddenly with abnormal noise ——— Searing or damage of the Piston, Rod, etc

Lubrication oil diluted and increased ——— Wear on the Injection Pump barrel or Plunger

Engine does not stop even though the fuel supply is cut (or over-running) ——— Too much oil
Wrong assembly of the governor system
Detached injection pump rack

3. Main Body

Low travel speed and vibration weak ——— Insufficient engine output and inappropriate high speed set revolution
Slipping of Clutch
Slipping of V-belt
Too much vibrator oil
Failure inside Vibrator Unit
Wear / damage of Shock Absorber



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