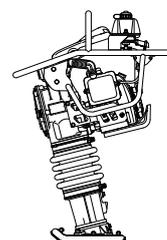


# Mikasa

TAMPING RAMMER

MT-66HL  
MT-66HRL  
MT-77HRL



## OPERATION MANUAL

en



<http://www.mikasas.com>

302-05906



## EC Declaration of Conformity

1 Manufacturer's name and address	<b>Mikasa Sangyo Co., Ltd.</b> 1-4-3, Kanda-Sarugakucho, Chiyoda-ku, Tokyo, 101-0064, Japan	
2 Description of the equipment	Compaction machines ( Tamping Rammers )  <div style="display: flex; justify-content: space-between;"> <span>2.1 Product</span> <span>MT-66HL</span> </div> <div style="display: flex; justify-content: space-between;"> <span>2.2 Type</span> <span>—</span> </div> <div style="display: flex; justify-content: space-between;"> <span>2.3 Version(s)</span> <span>—</span> </div> <div style="display: flex; justify-content: space-between;"> <span>2.4 Measured sound power level    dB(A)</span> <span>102</span> </div> <div style="display: flex; justify-content: space-between;"> <span>2.5 Guaranteed sound power level    dB(A)</span> <span>105</span> </div> <div style="display: flex; justify-content: space-between;"> <span>2.6 Motor type : Net power</span> <span>Air cooled , 4 stroke SI engine ( Honda GX100 ) : 2.1 kW</span> </div>	
2.1 Product		
2.2 Type		
2.3 Version(s)		
2.4 Measured sound power level    dB(A)		
2.5 Guaranteed sound power level    dB(A)		
2.6 Motor type : Net power		
3 Conformity assessment procedure	Annex VIII of 2000/14/EC as last amended by 2005/88/EC	
4 Notified Body's name and address	TÜV Rheinland LGA Products GmbH Tillystraße 2, 90431, Nürnberg, Germany Notified Body number: NB 0197	
5 Comply with relevant provisions and requirements of the following directives and standards	2000/14/EC , 2006/42/EC , 2014/30/EU EN 500-1:2006 +A1:2009 , EN 500-4:2011	
6 Signature	 <hr style="width: 200px; margin: 0 auto;"/>	Apr. 2024
	Kenichi Nagasawa : Director, General Manager R&D Division	
7 Technical documentation keeper	Engineer , R&D Division , Mikasa Sangyo Co., Ltd. 15-1,Shimoosaki,Shiraoka-city,Saitama,349-0203,Japan	
Reference data	MT-66HL	
Hand-arm vibration level ※    Ahv    m/s <sup>2</sup>	—	

※ Directive 2002/44/EC compliant. Test course (crushed gravel) is in comply with EN 500-4

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2 Description of the equipment	Compaction machines ( Tamping Rammers )  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">           2.1 Product            2.2 Type            2.3 Version(s)         </div> <div style="text-align: center;">           MT-77HRL             MT-66HRL         </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">           2.4 Measured sound power level    dB(A)            2.5 Guaranteed sound power level    dB(A)         </div> <div style="text-align: center;">           103            105         </div> </div> <div style="margin-top: 10px;">           2.6 Motor type : Net power            Air cooled , 4 stroke SI engine ( Honda GXR120 ) : 2.7 kW         </div>					
3 Conformity assessment procedure				Annex VIII of 2000/14/EC as last amended by 2005/88/EC		
4 Notified Body's name and address				TÜV Rheinland LGA Products GmbH Tillystraße 2, 90431, Nürnberg, Germany Notified Body number: NB 0197		
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6 Signature				 <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border-top: 1px solid black; width: 200px;"></div> <div style="text-align: right;">Apr. 2024</div> </div> <p>Kenichi Nagasawa : Director, General Manager R&amp;D Division</p>		
7 Technical documentation keeper				Engineer , R&D Division , Mikasa Sangyo Co., Ltd. 15-1,Shimoosaki,Shiraoka-city,Saitama,349-0203,Japan		
Reference data				MT-77HRL	MT-66HRL	
Hand-arm vibration level ※    Ahv    m/s <sup>2</sup>	7.2	—				

※ Directive 2002/44/EC compliant. Test course (crushed gravel) is in comply with EN 500-4

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## 1. INTRODUCTION

- This instruction manual describes the proper methods for using the tamping rammer, as well as simple checks and maintenance. Be sure to read this instruction manual before using the rammer, in order to get full use of the excellent performance of this machine, to improve your operation and to perform engineering work effectively.
- After reading this manual, store it in a handy location for easy reference.
- For details about the engine in this machine, see the separate instruction manual for the engine.
- For inquiries about repair parts, parts lists, service manuals, and repair of the machine, please contact the shop where you purchased it, our sales office, or the Mikasa Parts Service Center. In addition, parts lists are available on the MIKASA website at: <http://www.mikasas.com/english/>

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

## 2. MACHINE OVERVIEW

### Application

Though compact and lightweight, this rammer creates a strong impact and you may expect a large tamping effect on the ground.

It will compact nearly all types of soil, except soft soil that contains too much moisture.

Use this rammer to tamp the ground for creating roads, embankments, and to prepare the surface to support buildings. It can also be used when burying gas or water lines, and electric cables.

### Warning About Incorrect Applications And Techniques

Do not use this machine on ground that is harder than the machine can handle, or for driving pilings or tamping rock beds. Furthermore, use of the machine on sloping ground such as the side of an embankment, may be make the machine unstable and can cause an accident. It can also result in premature machine wear due to uneven loads on the machine.

Use the machine with confidence for tamping earth and sand, soil, sand, gravel, and asphalt. Do not use the machine for other type of jobs.

### Structure

The upper section of the machine functions as a weight and consists of an engine section guide, a gear reducer section, and reciprocating section. It also accommodates the handle and the fuel tank sections, which are connected by rubber dampers.

The lower section of the machine which hits the ground, consists of a spring case to engage sliding motion, a sloping section to allow the machine to tilt toward the front, bellows to cover the foot, a sliding section, and a protective sleeve.

### Power Transmission

Power is provided by an air-cooled, 4-cycle, single-cylinder gasoline engine. The output end of the engine crankshaft is equipped with a centrifugal clutch.

As the engine speed increases, the centrifugal clutch expands and a pinion gear that is a part of the clutch drum engages a gear in the crank shaft on the main frame. The engine speed is decreased in order to produce the required force for tamping.

The rotating motion of the main frame crankshaft is converted to a reciprocating motion through a connecting rod. This reciprocating motion causes the foot to go up and down through a strong coil spring. The weight of the main body and the strong force from the engine compress the spring and the foot moves up and down, striking the ground forcefully.

### 3. WARNING SIGNS

The triangle shaped  marks used in this manual and on the decals stuck on the main body indicate common hazards. Be sure to read and observe the cautions described.

 <b>Warning labels indicating hazards to humans and to equipment.</b>	
 <b>DANGER</b>	Denotes an extreme hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, is likely to result in serious injury or death.
 <b>WARNING</b>	Denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in serious injury or death.
 <b>CAUTION</b>	Denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury to people and may damage or destroy the product.
<b>CAUTION</b> (without at  )	Failure to follow the instructions may result in damage to property.

### 4. CAUTIONS FOR SAFETY

#### 4.1 General Cautions

##### **WARNING**

- Do not work with this machine, when
  - you are tired or sick and not feeling well.
  - you have taken medicine or drug.
  - you have had a drink.



##### **CAUTION**

- Please read the operation manual well and work safely by using the machine properly.
- For handling of the engine, please refer to the separate engine operation manual.
- Please have a good understanding of the structure of this machine.
- Make sure to do work start inspection, regular self inspection and specified self inspection.
- To make your work safe, please use protective equipment (use specified helmet, protective shoes, etc.) and wear appropriate work clothes.
- Always use noise protection equipment such as ear muffs or ear plugs.
- Always check the machine to make sure it is in normal condition before operating the machine.
- The nameplates attached to the machine (nameplates showing operation method, warning, etc.) are very important for your safety. Clean the machine so that the nameplates can be read easily. If it is difficult to read the nameplate, please replace the old one with a new one.
- It is dangerous for young children to come near the machine. Please pay careful attention to the method of storing and the storage location for this machine. Especially the engine start key has to be taken out every time you finish your work, and keep it in a designated location.
- To do maintenance work, stop the engine.
- We are not responsible for accidents that have occurred after the machine was refurbished without approval from the manufacturer.



## 4.2 Precautions When Adding Fuel

### DANGER

- When adding fuel.
  - Be sure to work in a well ventilated location.
  - Be sure to turn the engine off and wait until it has cooled down.
  - Take the machine to a clear flat location without any combustibles nearby. Be careful not any over fuel. If you do spill some gasoline, wipe it all up.
  - Do not allow any open flames nearby while adding fuel. (In particular, smoking while adding fuel is strictly prohibited.)
- Adding fuel until it comes too close to the top of the inlet may cause the fuel to overflow. That is dangerous. Follow the instructions in the engine manual about the specified fuel level.
- When through adding fuel, tighten the tank cap securely.



## 4.3 Precautions About Where To Use The Machine

### DANGER

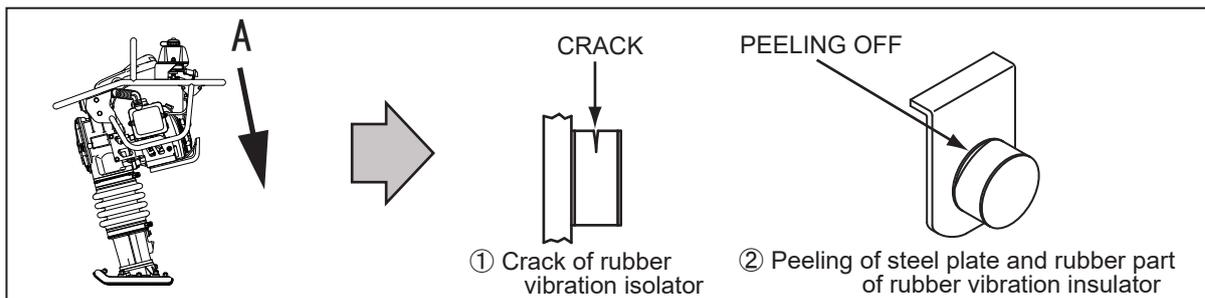
- **DO NOT** run the engine in an unventilated location, such as indoors or in a tunnel. The exhaust gas from the engine is carbon monoxide and is deadly.
- **DO NOT** operate the machine near open fires.



## 4.4 Precautions Before Starting Work

### CAUTION

- If you use the machine for a long time, be careful to watch for signs of vibration syndrome. Since this machine vibrates, operation for a long time may have a negative effect on your body. Take sufficient breaks while working.
- Before starting to operate the machine, check for other people or obstacles that are too close for safe operation.
- When starting the engine, the rammer may jump suddenly. Hold the handle firmly with one hand and pull the recoil starter with the other hand.
- Always be careful around scaffolding. Operate the rammer in a stable manner so that it will not become unbalanced.
- During operation, don't let the foot of the machine come too close to your foot. The plate may smash your foot.
- The main parts of the engine, the muffler, and muffler cover will be very hot during operation. Be careful not to touch them during operation or soon after operation.
- If you encounter any problems or abnormality with the machine during operation, while moving it or stopping operation, stop work immediately.
- Before leaving the machine, be sure to turn the engine off. Also, make sure to turn the engine off if you want to move the machine. When the throttle lever is in the stop position, the fuel cock is closed. Do not move the lever away from the stop position.
- When lifting the machine by the handle, be careful not to pinch your fingers between the handle and main body.
- Push down the rear end of the handle as shown in the right figure (A) and check that the rubber vibration isolator is not damaged. If breakage is found, please replace the left and right rubber vibration isolators with a set



## **DANGER**

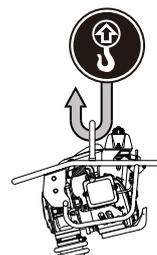
- Take the utmost care not to allow the machine to tip over during work, stored or stopped. Tie down the machine with a cable (wire or rope) when stopped or stored so that it cannot tip over.
- If the rammer tips over when children are nearby, they may have a serious accident.
- If the plate of the rammer is worn, the rammer will be especially unstable. If the plate of the rammer is severe worn, replace it with a new one.



### 4.5 Precautions While Lifting

## **DANGER**

- Before lifting the machine, make sure that there is no damage to any of the components on the machine (look especially for damage to the rubber mounts and the hook). There must not be any loose or missing screws and the machine must generally be in a safe condition.
- Turn the engine off before lifting the machine.
- Use wire cables with enough strength to support the machine.
- **DO NOT** lift it higher than necessary, for safety.
- **DO NOT** use a damaged wire cable.
- Only use the single hook to lift the machine. **DO NOT** support it from any other points (such as the handle).
- Never lift or lower the machine rapidly when using a hydraulic shovel or a crane.
- When lifting the machine, do not allow any people or animals to pass under or near the machine.
- When using any type of equipment to lift the machine, be careful that the lifting equipment does not cause an accident. Make sure you check the lifting equipment carefully, to ensure that there are no problems or damage.

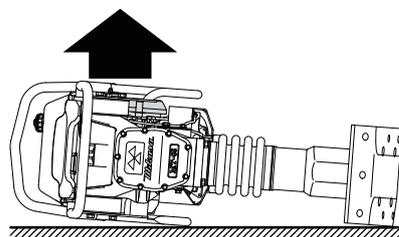


### 4.6 Transportation And Storage Precautions

## **DANGER**

#### ***When transporting***

- Before transporting the machine, stop the engine.
- **DO NOT** try to move it before the engine and machine body have cooled down enough.
- Drain any fuel before transporting the machine.
- Transport the rammer in a manner that keeps it level. If you must lay the machine down to transport it, drain any fuel from the fuel tank and carburetor. Then close the fuel tank cap and oil fill plug securely. Next, position the machine so that the air cleaner will be facing up.
- Tie down the machine body so that the machine cannot move or fall during transportation.
- When you want to lift the machine by gripping the handle, be careful not to pinch your fingers or hands between the handle and the main body.
- Since this machine is quite heavy, use a truck specifically designed to transport heavy objects.



#### ***When storing the machine***

- After the engine and machine body have cooled down enough, store the rammer so that it is level. Tie down the machine as needed so that the machine cannot fall down. If you must lay the machine down, close the fuel tank cap and oil fill plug securely. Arrange the machine position so that the carburetor will be facing up. After it lays down, make sure there are no oil or fuel leaks. (If fuel is leaking, drain it all from the fuel tank.)

## 4.7 Maintenance Precautions

### WARNING

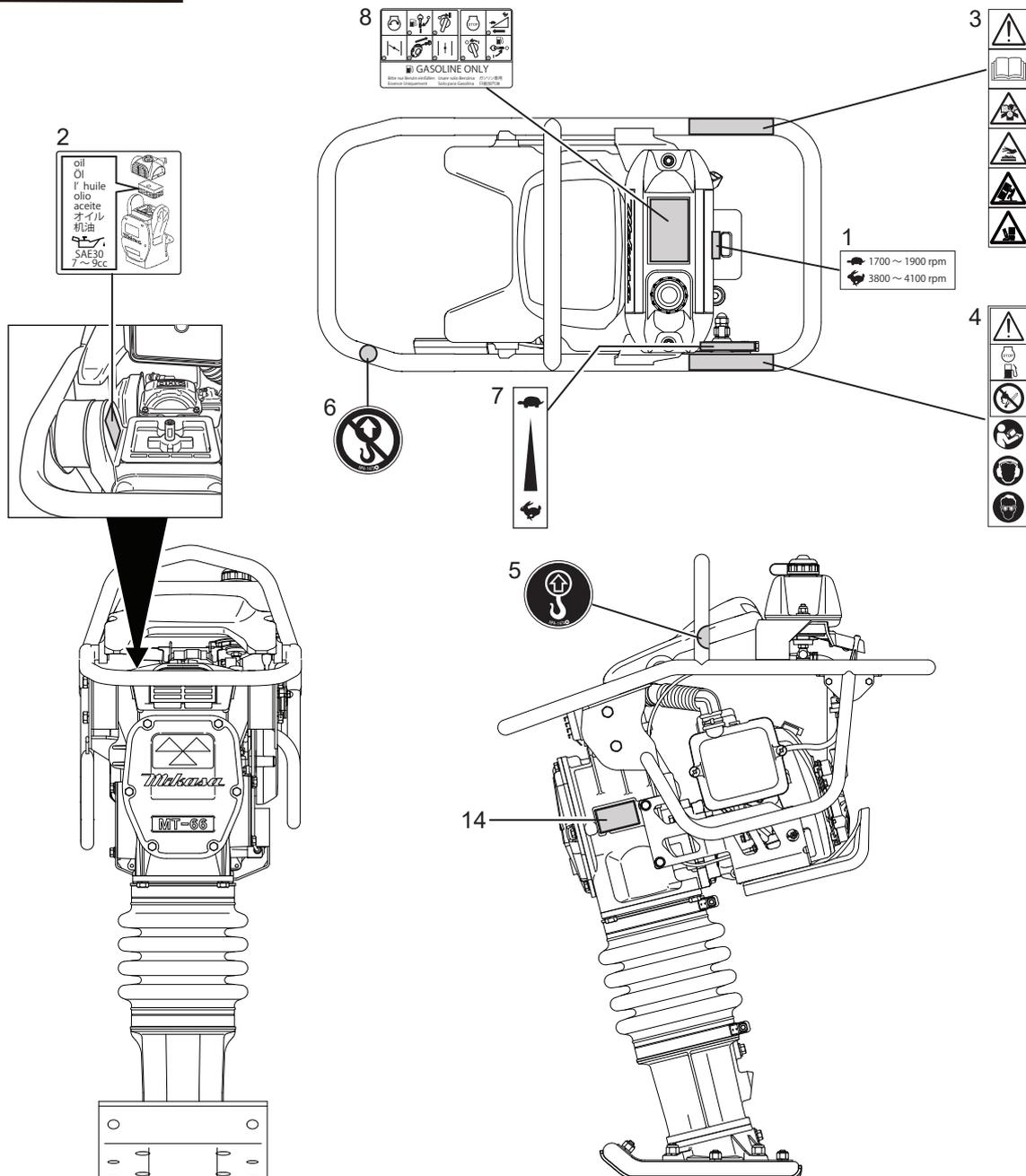
- Appropriate maintenance of the machine is required to ensure safety and keep the machine performing well. Always be aware of the machine's condition and keep it in good condition.

### CAUTION

- Be sure to turn the engine off before checking or adjusting the machine.
- The muffler and muffler guard become very hot. Do not touch them until they will have cooled down.
- The lubrication oil and engine oil are very hot and can burn you. Do not start any maintenance on the machine while the oil remains hot.
- After performing any maintenance, check the condition of the safety components and the general safety of the machine. In particular, check the nuts and bolts thoroughly.
- If you have to disassemble any components on the machine, be sure to refer the maintenance standard sheets and always work safely.



## 4.8 Decals Position



## 4.9 Decals List

No.	Part No.	Part Name	Remarks
1	9202-20690	DECAL,MAX SPEED	NPA-2069
2	9202-20640	DECAL,AIR CLERNER	NPA-2064
3	9202-20650	DECAL,DANGER REFUELING/GS	NPA-2065
4	9202-20660	DECAL,CAUTION(6 KINDS)	NPA-2066
5	9202-14730	DECAL,DO NOT LIFTING	NPA-1473
6	9202-14740	DECAL,LIFTING POSITION	NPA-1474
7	9202-11690	DECAL,LEVER OPERATION	NPA-1169
8	9202-20670	DECAL,OPERATION PROCEDURE	NPA-2067
14	9202-25880	PLATE,SERIAL NO./MT-66HL_CE	NPA-2588
14	9202-25890	PLATE,SERIAL NO./MT-66HRL_CE	NPA-2589
14	9202-21071	PLATE,SERIAL NO./MT-77HRL_CE	NPA-2107-1

## 4.10 Descriptions Of The Warning Decals

①



**Lethal Exhaust Gas Hazard.**  
Carbon monoxide poisoning may occur if the exhaust gas is inhaled. Do not operate the machine in a poorly ventilated area.

⑥



**Refueling Hazard.**  
Stop the engine and let cool before refueling.

②



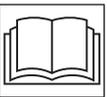
**Tip over hazard.**  
Take the utmost care not to tip over the machine during operation, storage or stop.

⑦



**Fire hazard.**  
Keep away any flames and sparks from the machine.

③



**Read the manual carefully.**  
Read and fully understand the operation manual before operating the machine.

⑧



**Eye hazard.**  
Always wear eye protection while operating the machine.

④



**Burn hazard.**  
Never touch the hot parts. Allow these parts to cool before servicing the machine.

⑨



**Noise hazard.**  
Always wear ear protection while operating the machine.

⑤



**Crush hazard.**  
Keep your foot away from the machine during operation. The plate of machine may crush your foot.

⑩



**Lifting position.**  
Use one point lifting hook for lifting the machine.

⑪



**No lifting position.**  
Do not use any other points (such as the handle) except one point lifting hook for lifting the machine.

## 5. SPECIFICATIONS

### 5.1 Body

Model		MT-66HL	MT-66HRL	MT-77HRL
Operating Weight	kg	72	←	77
Dimensions	mm			
Overall height		1070	←	←
Overall width		375	←	←
Overall length		740	←	←
Plate Size	mm			
Width		285	←	←
Length		340	←	←
Jumping Stroke	mm	50~80	←	←
Impact Force	kN (kgf)	12.7 (1300)	←	13.7 (1400)
Impact Number	Hz (vpm)	10.7~11.6 (644~695)	←	←
Fuel Tank Capacity	liters	2.0	←	←
Rammer Body Oil Grade		Automobile Oil SAE 10W-30	←	←
Rammer Body Oil Capacity	cc	750	←	←

### 5.2 Engine

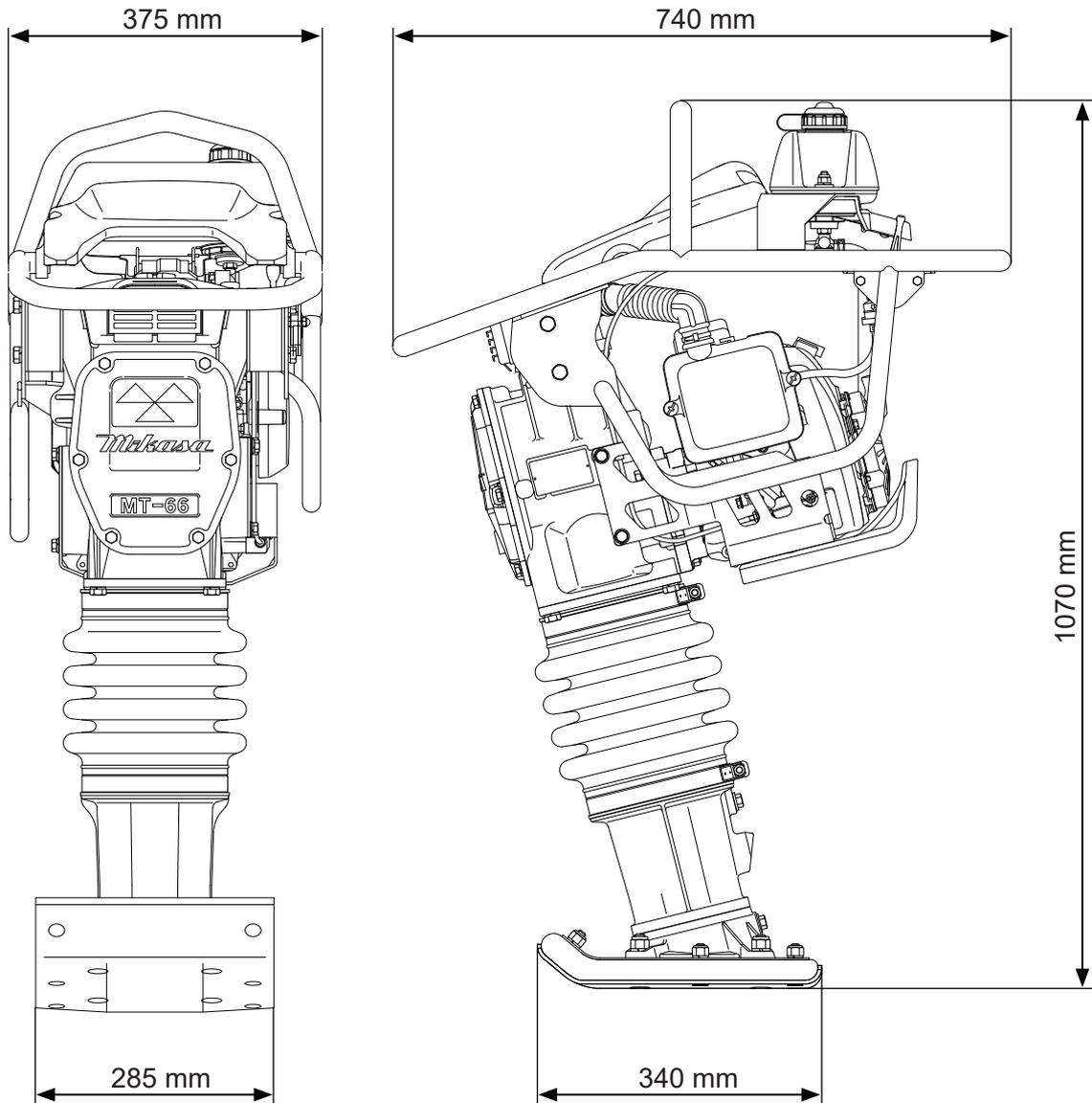
Model		HONDA GX100 RAMMER	HONDA GXR120 RAMMER
Type		Air-cooled 4 stroke single cylinder gasoline engine.	←
Carburator		Float type	←
Piston Displacement	cc	98	121
Max. Output	kW(PS)/rpm	2.1(2.9) / 3600	2.7(3.7) / 3600
Max. Torque	N·m(kgf·m)/rpm	5.7(0.58) / 3600	7.5(0.76) / 2500
Fuel		Gasoline	←
Engine Oil Grade		API SJ or later SAE 10W-30	←
Engine Oil Capacity	cc	280	←
Spark Plug		NGK CR5HSB	←
Starting System		Recoil starter	←
Operating Engine Speed	rpm	3800~4100	←

※ Based on "SAE J1349"

※ Specifications are subject to change without notice.

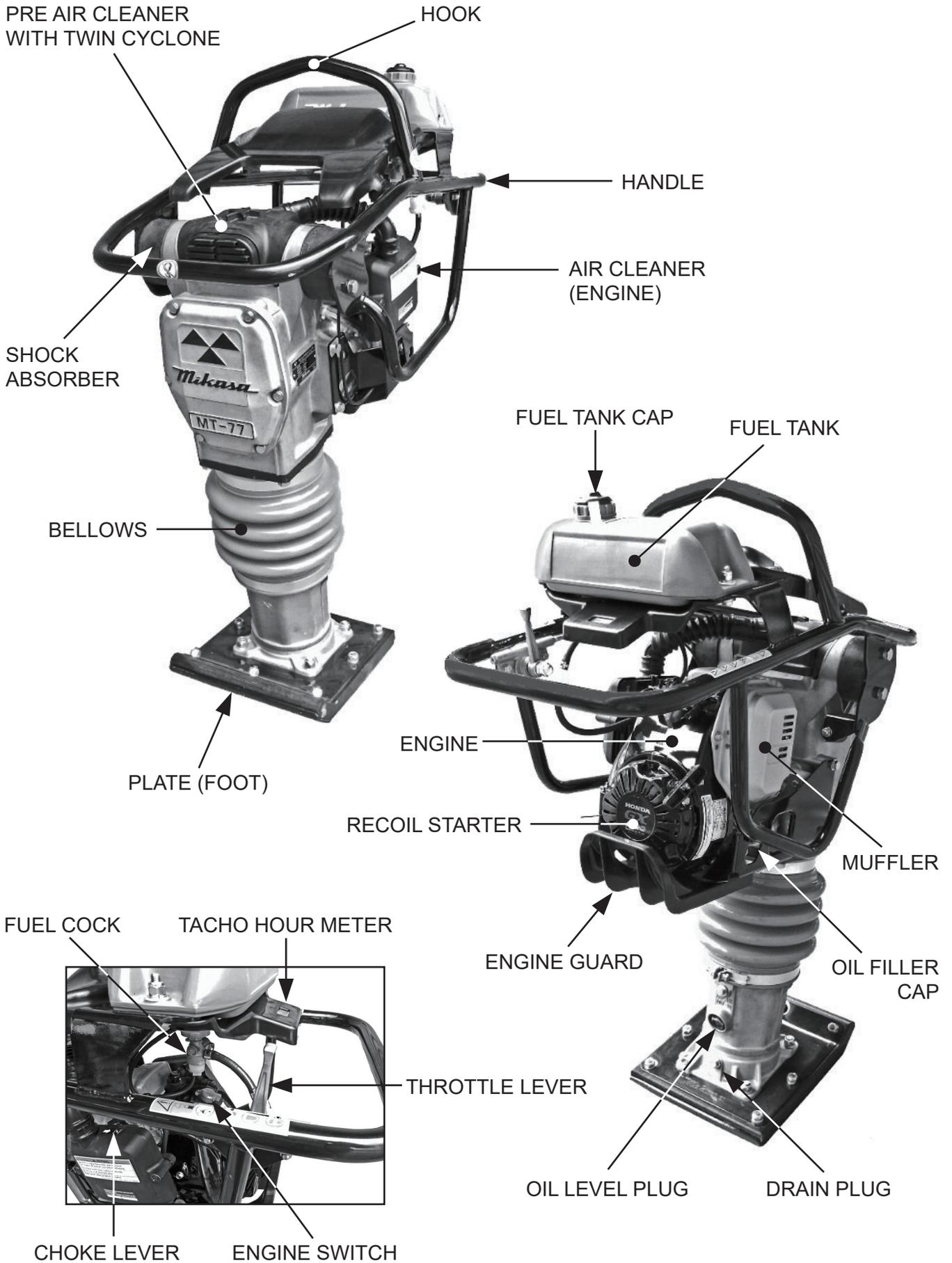
## 6. APPEARANCE

### 6.1 Dimensions



※ Specifications are subject to change without notice.

**6.2 Components**



## 7. INSPECTION BEFORE OPERATION

### ⚠ WARNING

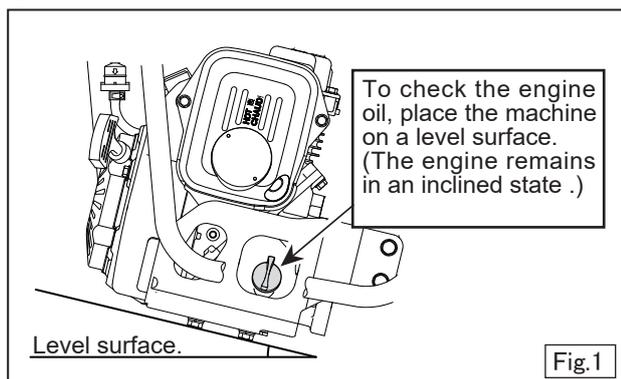
- Only check the machine while the engine is stopped. Otherwise, you may be caught by the rotating components and be seriously injured.
- Check the machine body only after it has cooled down. The muffler is very hot and you may be badly burned.



Inspection points	Inspection items
Appearance	Flaws, deformity, stains
Air cleaner	Stains, flaws, deformation
Bolts, nuts	Loose or missing parts
Handle	Flaws, deformity, cracks, breaks
Rubber damper	Flaws, deformity, cracks, breaks
Engine oil	Leaks, oil level, dirt
Main body lubrication oil	Leaks, oil level, dirt
Fuel tank	Leaks, fuel level, presence of dirt
Fuel system	Leaks, wear, loose parts

1. Clean each components thoroughly so that there is no mud or dirt on it. In particular, remove any mud on the machine foot, and clean the area around the recoil starter and carburetor.
2. Make sure that all of the screws are tight. Loose screws may cause an accident due to the vibration.
3. To check the engine oil, place the machine on a level surface (The engine remains in an inclined state.). (Fig.1)  
For details about the engine, see the separate operation manual for the engine.

- Oil type: API SJ or later SAE 10W-30
- Oil amount: 280cc

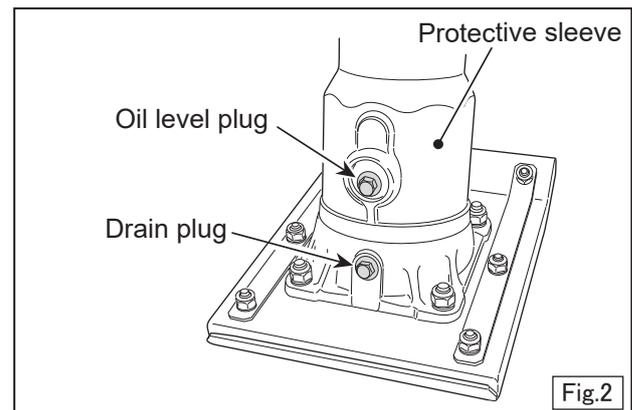


### ⚠ WARNING

Add the engine oil before it gets too low. Too little engine oil may cause the engine to wear prematurely.

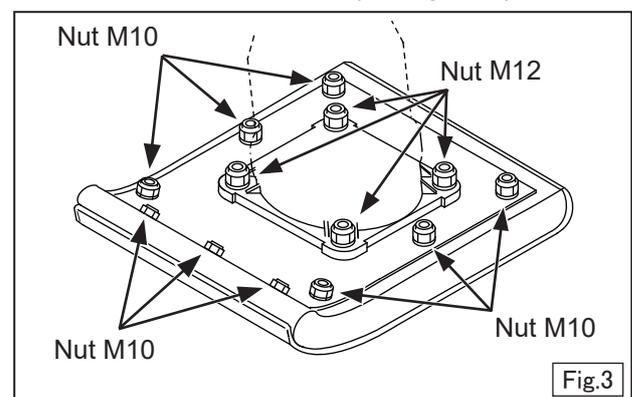
4. Place the machine on a level surface, and remove the oil level plug on the protective sleeve, then visually check if the oil is at the specified level from the hole of oil level plug. (Fig.2)

- Oil type: API SJ or later SAE 10W-30
- Oil amount: 750cc
- Tightening torque:  
Oil level plug : 39.2N·m (400kgf·cm)  
Drain plug : 49.0N·m (500kgf·cm)



5. Before using, be sure to retighten each nuts for foot mounting. (Fig.3)

- Tightening torque:  
Nut M10 : 29.4N·m (300kgf·cm)  
Nut M12 : 78.4N·m (800kgf·cm)



6. Visually check fuel level. If fuel level is low, refuel with unleaded fuel. (Fig.4)  
When refueling, be sure to use a strainer for filtration.

**⚠ DANGER**

Fire hazard while refueling.

**⚠ CAUTION**

If any fuel spills, wipe it all up.

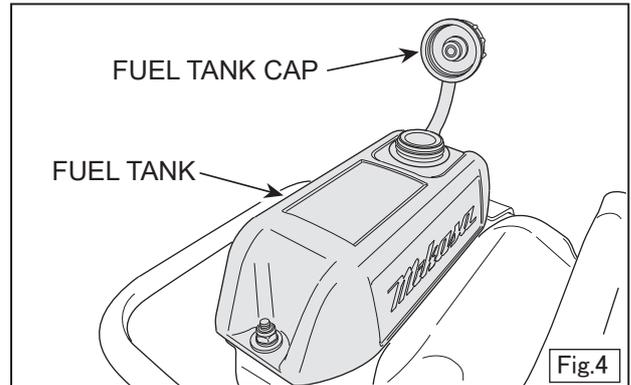


Fig.4

## 8. OPERATION

### 8.1 Starting

1. Set the fuel cock lever to the "ON" position to let the fuel flow. (Fig. 5)

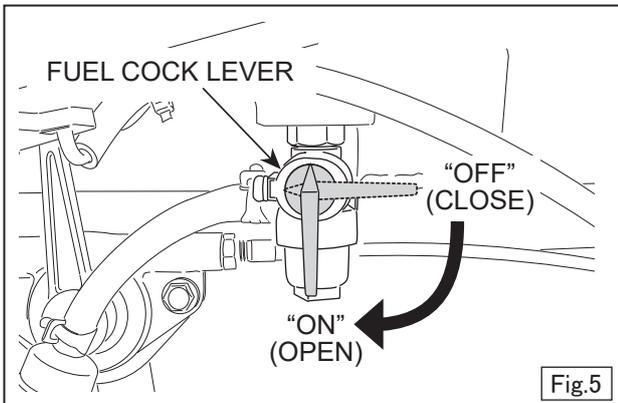


Fig.5

2. Turn on the engine switch on. (Fig.6)

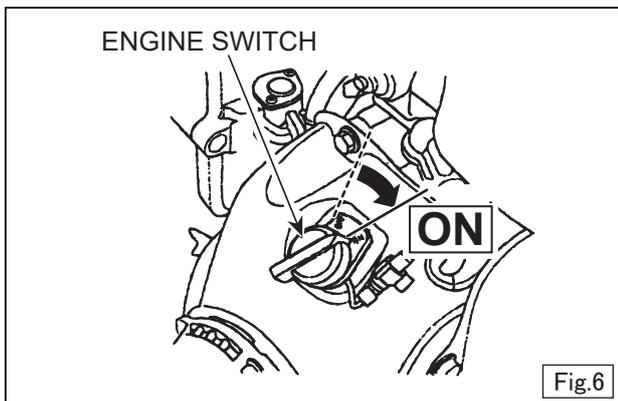


Fig.6

3. Move the choke lever on the carburetor to the closed position. When it is cold, close the choke all the way. When it is hot, such as in the summer, or when the engine is already hot, open the choke a little or leave it fully open. (Fig.7)

**⚠ CAUTION**

If the engine cannot be started, open the choke a little so as not to flood the carburetor.

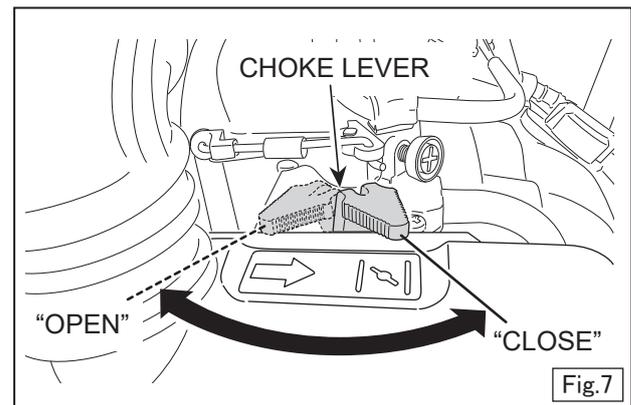


Fig.7

4. Hold the recoil starter handle and pull it a little. You will feel resistance. Then, pull it hard to turn the engine. Allow the starter rope to return slowly into the case before letting go of the handle. (Fig.8)

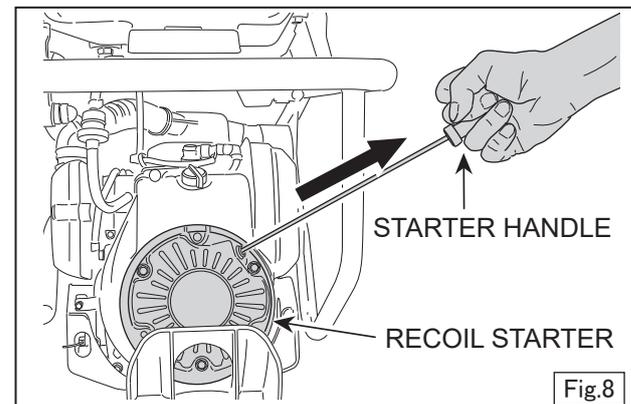


Fig.8

5. After the engine has started, open the choke lever gradually until it is wide open. Pay attention to the sound of the engine to guide you in the amount to open the choke. After the engine has started, be sure to warm up the engine at low speed for 3 to 5 minutes. During this time, check the machine for leaking fuel, abnormal sounds, or abnormal exhaust color or odor.

**⚠ CAUTION**

When warming up, pay attention to engine speed to prevent clutch slipping.

- If the engine cannot be started after pulling the starter handle several times, remove the spark plug and see if it has a spark. If the plug is wet from fuel (due to flooding from the carburetor), or if it is stained, replace the plug with new one.

**CAUTION**

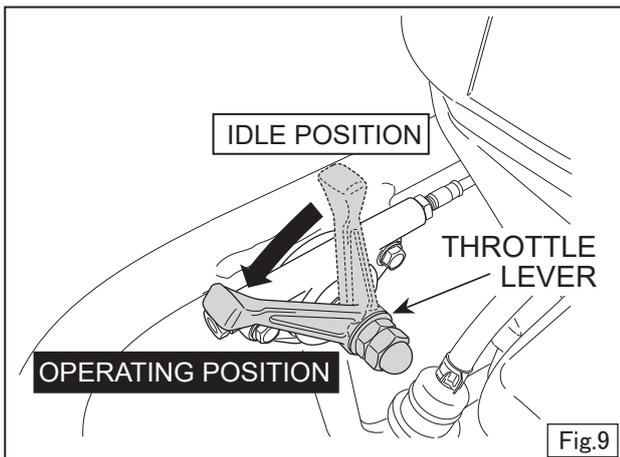
While the plug is removed, pull the starter handle 2 to 3 times to discharge any fuel from the cylinder.

## 8.2 Operation

- Move the throttle lever from idle to the operating position quickly and the tamping rammer will start up and down motions. (Fig. 9)

**WARNING**

Moving the lever slowly will cause irregular operation and damage the clutch, springs, and foot.



**WARNING**

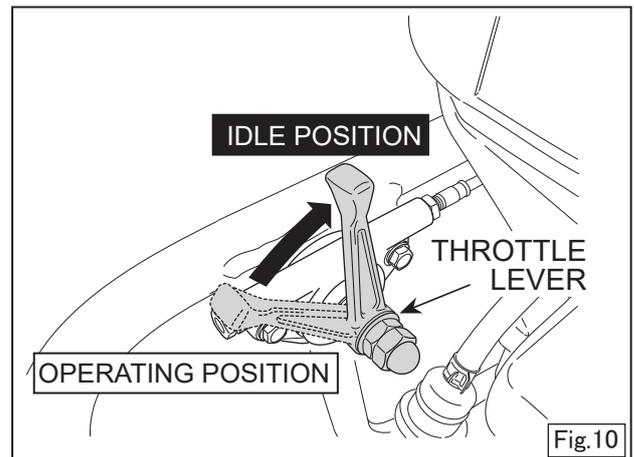
If the rammer is used on sloping ground, check the safety of the surroundings and be careful not to allow the machine to fall over.

- In the cold season, the oil in the machine will be hard, and the sliding resistance of the components will be much larger, which may cause irregular motion. Move the throttle lever from the operation to the idle position several times and allow it to warm up sufficiently before starting actual work.
- The surface of the foot in contact with the ground is a metal sheet that has excellent wear resistance. However if you need to tamp ground that contains large stones (about the size of a fist), first put some fill soil over them so that the foot will tamp the ground evenly.

- The machine body will forward as it jumps. If you want to move forward faster, push the handle a little forward to make the machine body lean a little forward.
- To halt work, move the throttle lever from the operation position to the idle position quickly. (Fig. 10)

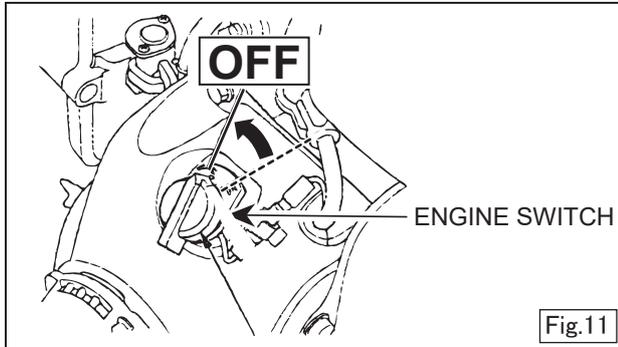
**CAUTION**

Do not move the throttle lever slowly to prevent the clutch slipping.

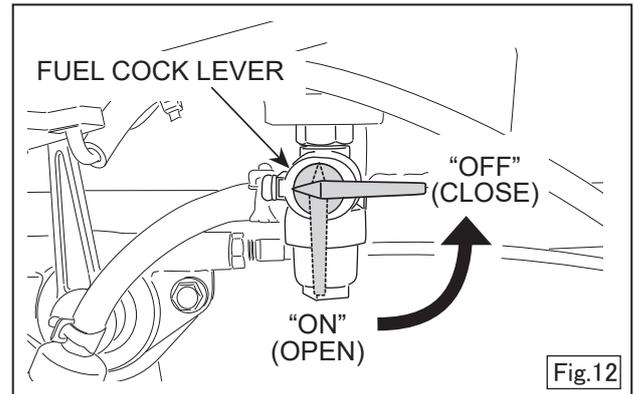


## 9. STOP

1. Move the throttle lever to the idle position quickly, and run the engine for 3- 5 minutes at idling speed.  
After temperature is lowered, turn the engine switch to the "OFF" position. (Fig.11)

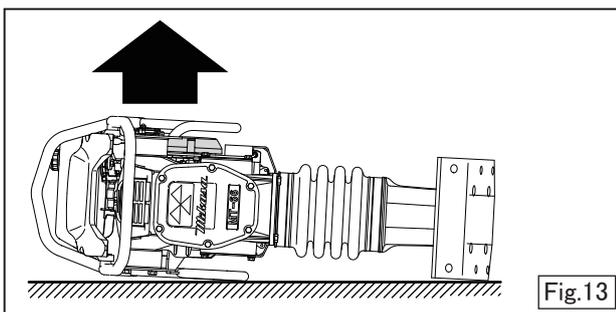


2. Close the fuel cock. (Fig.12)



## 10. STORAGE

1. Wash off any dirt or mud on each part of the machine using fresh water.  
After the engine and main body have cooled down, store the rammer on a level location.
2. Maintain upright position of the rammer on a level location during storing, tie down it to prevent tip over.
3. In case of laying down the rammer, lay down it with the are cleaner facing up, and close the fuel tank cap securely and tighten engine oil drain plug. (Fig.13)



6. When transporting the rammer, drain any fuel from the fuel tank and carburetor.
7. The rammer position during transport is the same as 2 and 3 for the storage as above.
8. For prolonged storage
  - Move the throttle lever to the idle position.
  - Drain any fuel and change the lubrication oil.  
Be sure to remove any fuel in the fuel hose, too.
  - Cover the air intake on the air cleaner and the exhaust outlet on the muffler.
  - Store the machine indoor. Do not leave it outside.

4. Avoid storage areas with high temperature and high humidity, or environments with severe temperature changes. Keep away from direct sunlight and rain.
5. Put a cover on the machine to avoid depositing dirt.

# 11. INSPECTION AND MAINTENANCE

## ⚠ WARNING

- Only check the machine while the engine is stopped. Otherwise, you may be caught by the rotating components and be seriously injured.
- Check the machine body only after it has cooled down. The muffler is very hot and you may be badly burned.



## 11.1 Inspection And Maintenance Schedule

Inspection interval	Inspection parts	Inspection items	Remarks
Daily (before starting operation)	Appearance	Deformation, Breakage, Crack, Dirt	
	Air cleaner	Dust, Dirt, Deformation	
	Bolts, nuts	Loose or missing parts	
	Handle	Deformation, Breakage, Crack	
	Shock absorber	Deformation, Breakage, Crack	
	Engine oil	Leaks, Oil level, Dirt	Engine oil
	Main body lubrication oil	Leaks, Oil level, Dirt	Engine oil
	Fuel tank	Leaks, Fuel level, Dirt	Gasoline
	Fuel system	Leaks, Wear, Loose parts	
After first 20 hours	Engine oil	Change once after the first 20 hours.	Engine oil
Every 50 hours	Spark plug	Cleaning, Adjust gap	
	Fuel cock	Cleaning	
	Air cleaner element (Engine)	Cleaning	Tap the several times or Blow compressed air inside.
Every 100 hours	Engine oil	Change	Engine oil
Every 150 hours	Air cleaner element (Upper)	Cleaning	Clean with kerosene, then apply and squeeze Engine oil (7-9 cc).
Every 200 hours	Main body lubrication oil	Change (First change at 50 hours)	Engine oil
	Air cleaner element (Engine)	Change	
Every 2 years	Fuel hose	Change	
	Intake pipe	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.

## 11.2 Inspection And Maintenance Work Contents

### 1. Daily service

Remove dirt and dust from engine and control area.  
Clean air cleaner as necessary.  
Retighten all nuts for assembling foot. (Fig.15)  
Repair as needed.

Tightening torque:

Nut M10 : 29.4N·m (300kgf·cm)  
Nut M12 : 78.4N·m (800kgf·cm)

## ⚠ CAUTION

Before using, be sure to retighten all nuts for assembling foot.

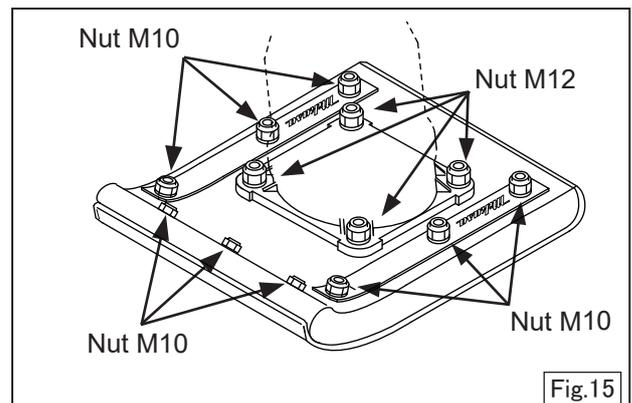


Fig.15

## 2. Fifty hours service

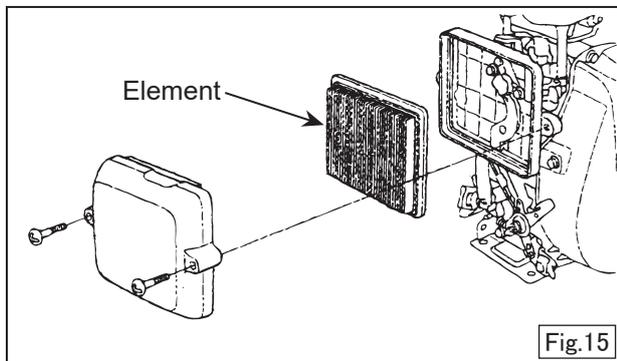
Clean the fuel cock. Adjust spark plug gap to 0.02-0.03 inch (0.6-0.7mm). This unit has electronic ignition which requires no adjustments.

### ● Air cleaner (Engine) cleaning

Remove the element from the air cleaner (engine) and Tap the paper air filter element several times on a hard surface to remove dirt, or blow compressed air through the filter element from the air cleaner case side. (Fig.15)

#### ⚠ CAUTION

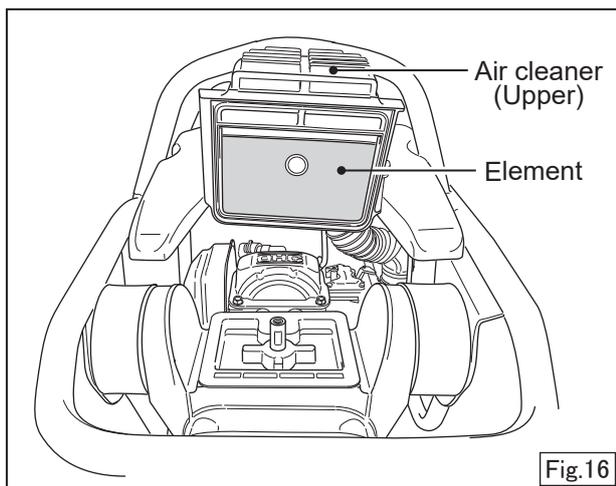
For details about the check and maintenance of the engine, please refer to the attached engine operation manual.



## 3. One-hundred fifty hours service

### ● Air cleaner (Upper) cleaning

Remove the element from the air cleaner (upper part) and wash it with kerosene. Impregnate the engine oil of 7 to 9 cc from the lower element (yellow) and squeeze lightly to assemble well to the upper element (gray), then install it. (Fig.16)



## 4. Two-hundred hours service

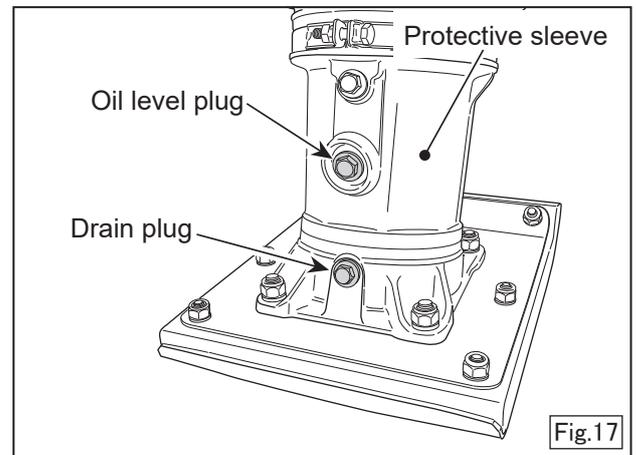
### ● Replacement of body lubricant

Place the machine body on a level surface and look at the oil gauge on the protective sleeve, from the right side. See if the oil is at the specified level. (Fig.17)

Oil type: Use 10W-30 engine oil  
rated SE or SF or better for the engine.

Oil amount: 750cc

Tightening torque: 39.2N·m (400kgf·cm)



### ● Air cleaner (Engine) replace

Replace the element(engine). (Fig.15)

## 5. 2 years service

### ● Fuel hose

Please make sure that the fuel hose is damaged and the mounting part is not loose. Even if there is no abnormality at inspection, please replace the fuel hose in 2 years.

### ● Intake pipe

Please make sure that the intake pipe is damaged and the mounting part is not loose. Even if there is no abnormality at inspection, please replace the intake pipe in 2 years.

## 6. Precautions for washing machine

When washing with a high pressure steam machine, do not put water directly on the air cleaner, carburetor, muffler, tank cap. There is a fear of engine trouble.

## 12. TROUBLESHOOTING

### Engine

#### 1. Won't start

Fuel is present but the spark plug is not sparking.	Electricity is being supplied to the high voltage cable.	The gap in the spark plug tip is clogged. Carbon is stuck on the spark plug The spark plug has a short circuit due to faulty insulation. The gap in the spark plug is the wrong size.
	Electricity is not being supplied to the high voltage cable	The stop button switch has a short circuit. The ignition coil is broken.
Fuel and spark are both present.	Compression is good	The muffler is clogged with carbon. The wrong fuel was used. The air cleaner is clogged. The fuel is contaminated with water or dirt. The cylinder head gasket is blown or the head is not correctly tightened.
	Compression is low	The piston rings don't fit well. The cylinder is worn. The spark plug is not seated tightly. The valve seat is damaged.
Fuel is not being supplied to the carburetor.	No fuel in the fuel tank. Faulty fuel cock operation. The fuel filter is clogged. The air hole in the cap on the fuel tank is clogged. Air is trapped in the fuel line.	

#### 2. Faulty operation

Too little power	Good compression and no misfiring		Dirt in the air cleaner. Air trapped in the fuel line. Carbon has accumulated in the cylinder.
	Low compression (See "Compression in low" above)		
	Good compression but misfires		Faulty ignition coil. Dirt on the spark plug. Ignition coil shorts sometimes.
Engine overheats	Excessive accumulation of carbon in the combustion chamber. Clog exhaust port or muffler. Faulty spark plug.		
Smoke comes from the muffler	Black smoke		Choke lever wasn't returned to the open position.
	Blue smoke	Good compression	Blended oil (for 2-cycle engines) was used. Too much oil. Engine oil leaked into the air cleaner when the machine was laid down on the wrong side.
		Compression is low	Worn piston rings. The piston rings don't fit well.
White smoke		Moisture in the gasoline. The air cleaner is wet.	

(In the winter, the machine may emit white smoke for a while when first started in the morning. This is not abnormal.)

Engine speed fluctuates	Faulty governor adjustment. Faulty governor spring. Faulty fuel flow. Air being sucked into the fuel line.
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