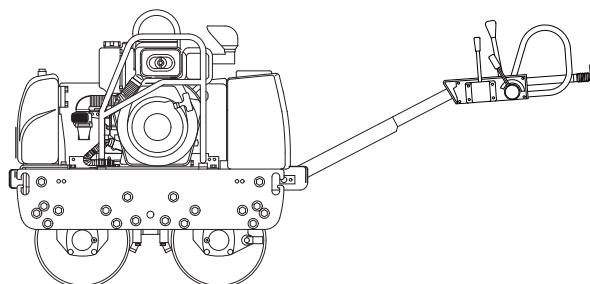


Mikasa

VIBRATION ROLLER

MRH-700DSB



INSTRUCTION MANUAL

en



<http://www.mikosas.com>

502-03902



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1. INTRODUCTION

Thank you for your purchase of MIKASA MRH vibration roller. This product can be operated easily by the first time user for rolling compaction because, with this machine using hydraulic pump and hydraulic motor, just the operation of the running lever enables the operator to do forward and reverse switching and non-stage shifting of the speed.

This manual describes the operation method and easy maintenance of this vibration roller. Please read this manual before using this machine. For the engine, please refer to the separate operation manual.

2. MACHINERY OVERVIEW

Application

This vibration roller does rolling compaction by vibrating the drum with the strong one axis vibration of the vibrator.

Compaction effect is delivered to most of the soil types except for soft soil with high water content. So, this machine can be used for a wide range of rolling compaction of earth and sand mixture, earth, sand, gravels and asphalt.

Because the vibration and the running of this machine are separated, the machine is capable of doing static pressure rolling compaction and rolling compaction on a sloping surface. With its good work efficiency, this machine is suitable for a wide range of rolling compaction work.

On the ground with high water content, especially on the clayish soil, this roller will not work properly, with the drum not running effectively. On the other hand, on the firmly compacted ground that is stiffer than the level of this machine's compaction capability, do not try to operate this machine by applying vibration because that might result in the damage of this machine

Do not use this machine for works other than those described above.

Structure

An engine, hydraulic pump, oil tank, vibration clutch for vibration, sprinkler tank, and handle are on the upper portion of this machine. Via an antivibration rubber, the upper portion is fixed to the frame that connects to the lower portion.

The lower portion of the machine consists of a vibrator that generates vibration, two drums with hydraulic motor for running and a frame to support the vibrator part.

Power Transmission


A water-cooled single cylinder diesel engine is mounted on, of which power output is transferred through centrifugal clutch. A centrifugal clutch is engaged with by the acceleration of engine speed. Rubber Coupling with pins built-in Clutch Drum transfers the engine power to Hydraulic Pump for traveling.






Hydraulic Pump generates hydraulic pressure through out hydraulic hose calling from oil tank. Hydraulic pressure is transferred to hydraulic motor built-in Drum Bracket to move the drum. Traveling speed and Forward-Reverse motion is adjusted by the incline motion of Travel Lever. The adjustment of Control Cable can let trunnion spin of hydraulic pump, and the one of Body side can let Handle Bar move slightly.

Centrifugal Clutch Drum united with V-pulley(1), is connected through V-belt to V-pulley(2) at the counter axis end. Output Axis of Vibration Clutch is connected to V-pulley(3) to rotate, and transferred to V-pulley(4) to switch Vibration system.

The vibration generated by Vibration unit is transferred to Side Plate, Drum Bracket and Drum in order, to compact the ground with Dynamic Vibration Force.

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.

 Warning labels indicating hazards to humans and to equipment.	
 DANGER	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.
 WARNING	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.
 CAUTION	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.
CAUTION (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, or
 - 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 and remove the battery wiring.
- We are not responsible for accidents that have occurred after the machine was refurbished without approval from the manufacturer.



4.2 Cautions During Refueling

DANGER

- Always refuel in a well ventilated area.
- Make sure to stop the engine and wait until the engine cools down when refueling.
- Select a flat surface area with no flammable material around for refueling. Be careful not to spill the fuel. Wipe off well if there is any spill.
- Never put fire near the machine during refueling. (Especially, be careful about smoking.)
- If you fill to the top of the fuel tank inlet, fuel might spill out from the tank, and it becomes dangerous
- After refueling, tighten the tank cap well.



4.3 Cautions About The Location Of Use And Ventilation

DANGER

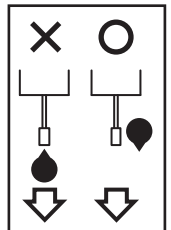
- Do not use this machine in an area with poor ventilation, such as indoor or inside a tunnel. The exhaust gas from the engine contains poisonous gas, such as carbon monoxide, which is very dangerous.
- Do not operate this machine near fire.



4.4 Cautions For Work

WARNING

- When parking this machine, or moving away from the machine while it is stopped, always apply the parking brake and use the wheel stopper. Also, never park on a sloping surface.
- Do not stop the machine on a soft ground where the wheel stopper will sink in.
- During work or while driving to move to other location, run the engine to the specified maximum revolution. Especially on a sloping surface, when the engine revolution is low or if the engine stops suddenly, the machine might start to move by its own weight. While working by moving up on a sloping surface, the machine might move back toward you, and there is a danger of being caught between the machine and some other object. So, it is recommended to operate the machine at either the left or right side of the machine, not directly behind the handle.
- When working with the machine on a side sloping surface, there is a danger of rollover, so please be extra careful. Also, make sure there is nobody at the bottom of the slope.
- When reversing, to make it easier for the operator to check behind, the operator should operate the machine by facing towards the back either at the left or right side of the operation handle. Do not try to reverse by facing the front by standing right behind the handle.
- The engine and muffler become very hot. Do not touch the hot part during operation.



CAUTION

- Because the handle is heavy, be careful when you try to move it from the upright position (stored position) to the operation position. Always check to make sure the handle lock is functioning.
- When starting the engine, make sure it is safe to do so by checking the surroundings for people and objects. Also make sure the running lever is at neutral position and the vibration switch is set to OFF.
- Make sure that no one can enter the area where work is done.
- Do not operate the machine with the handle at the upright position. The operation becomes unstable and it becomes very dangerous if the handle is at the upright position. Especially during reversing, there is a danger of being caught between the machine and some other object.



CAUTION

- Do not touch the moving parts and rotating parts during operation. Also, do not go near the rotating part because your clothes might get caught.
- Do not rush when making forward/reverse switching. Do not make sudden starting or sudden stop except for emergency situation.
- When coming close to an object while working by reversing, stop at about two meters in front of the object, then reverse the roller at a safe location before starting your work by forward movement.
- Have the work area well illuminated when working at night.
- If your work might become dangerous because of bad weather, stop your work.
- If you experience any trouble with the machine or notice any abnormality during your work, immediately stop your work and inform someone responsible for the work to take appropriate action.

4.5 Cautions For Transporting The Machine

WARNING

- Do not try to tow this machine by a car or a heavy machine.
- For unloading, designate a person responsible for the unloading work, then follow the instruction of that person.
- Choose a flat surface area for unloading.

WARNING

- If oil or dirt is on the rear deck of a transportation vehicle, the ramp and the machine, it becomes slippery and very dangerous. Clean well to remove oil and dirt before unloading.
- For transportation, always stop the engine and drain the fuel.
- After loaded, use the stopper (wheel stopper) to hold the machine, then fix it with wire rope.

CAUTION

- The ramp used for unloading should have sufficient strength, and it has to be securely fixed to the rear deck of the transportation vehicle at its hook part. The width of the ramp should be adjusted to the width of the machine, and the gradient has to be within 15 degrees.
- Before putting the machine on the ramp, determine the direction of the machine correctly. There is a danger of machine falling off if the orientation of the machine is even slightly off the correct position. So, correct the machine orientation by putting it back to its original position, then unload.
- Loading, in principle, should be done by the forward movement, and for unloading, use backward movement.
- Qualification is required for unloading work using a crane. You need to have someone qualified for crane operation or slinging work.
- When lifting this machine, always lift at the part (hook, etc.) specified.
- Before lifting, check for any breakage or loosened part, or fallen off part of this machine.
- When lifting, stop the engine.
- Use a damage-free wire rope that has sufficient strength.
- Never do sudden lifting up (lifting down) nor make sudden lateral movement while lifted.
- Make sure there is no person/animal around under the lifted machine.
- Do not lift up higher than the required height.

4.6 Cautions For Maintenance

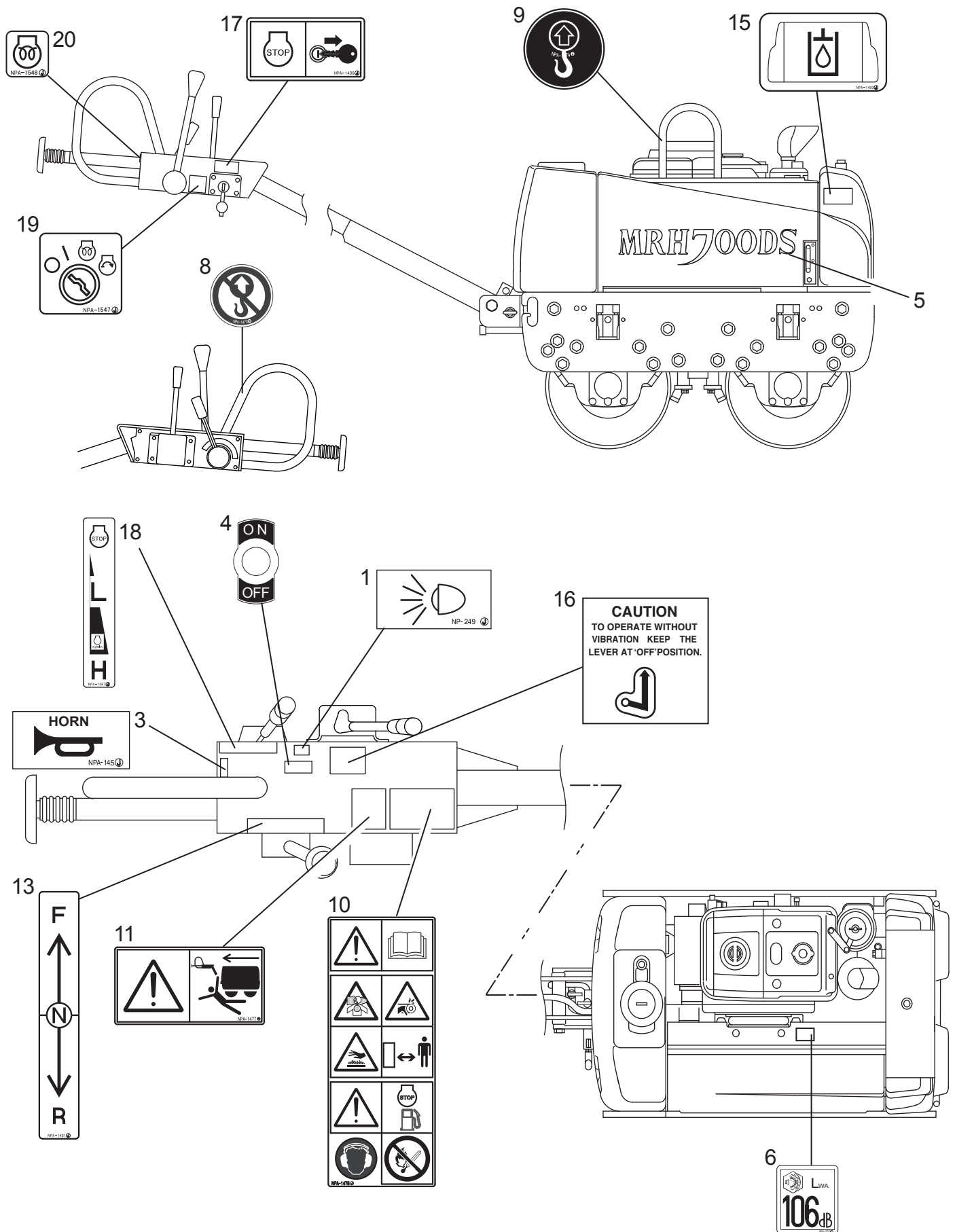
WARNING

- To secure safety, appropriate maintenance is required. Because inappropriate maintenance might result in serious accident, always keep the machine in good condition.
- For inspection and adjustment, always stop the engine and wait until the engine and other parts cool down.
Even when removing the radiator cap, always wait until the engine cools down.
- For inspection and maintenance of electric system, remove the (-) terminal of the battery.

CAUTION

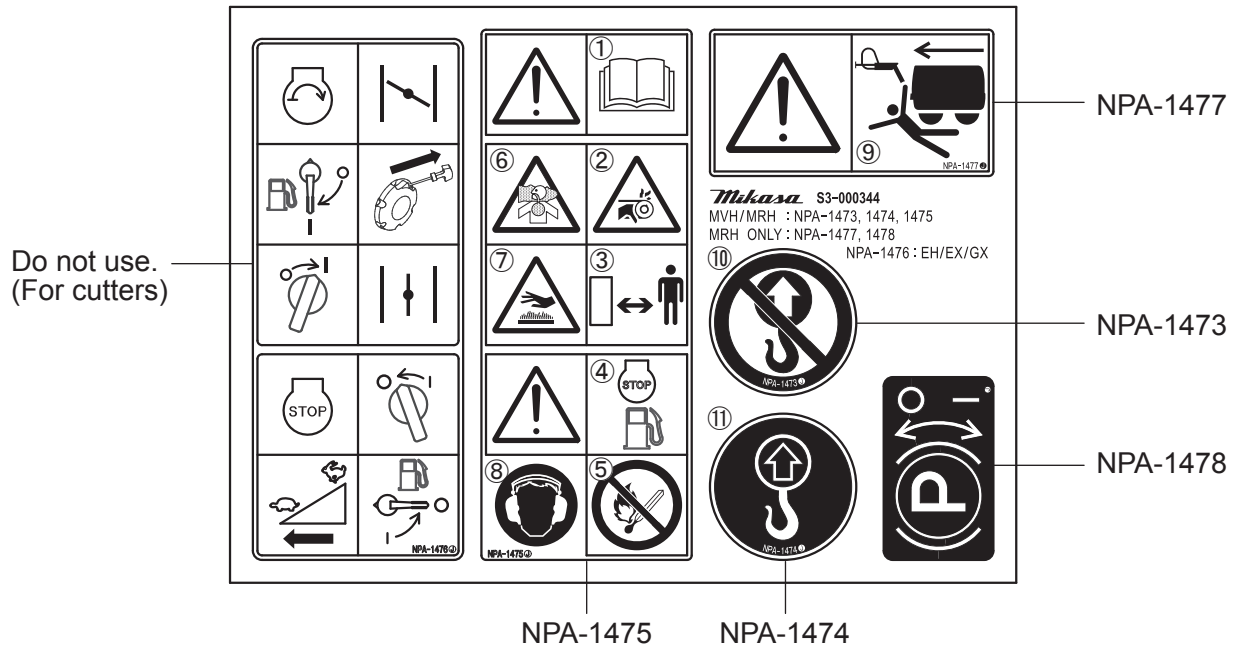
- When loosening the hydraulic pipe, always lower the pressure in the hydraulic circuit. If you remove the pipe while the pressure is still high, the force of the hydraulic pressure might cause the hose to hit you and you might get injured.
- After maintenance, check the installed condition of the security parts and the safety. Make sure that tightening of bolts and nuts was not forgotten.

4.7 Label Attachment Position



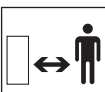











4.9 Label Description

Part code No. 9209-00090 DECAL, SET /MVC, MCD /EXP, EU

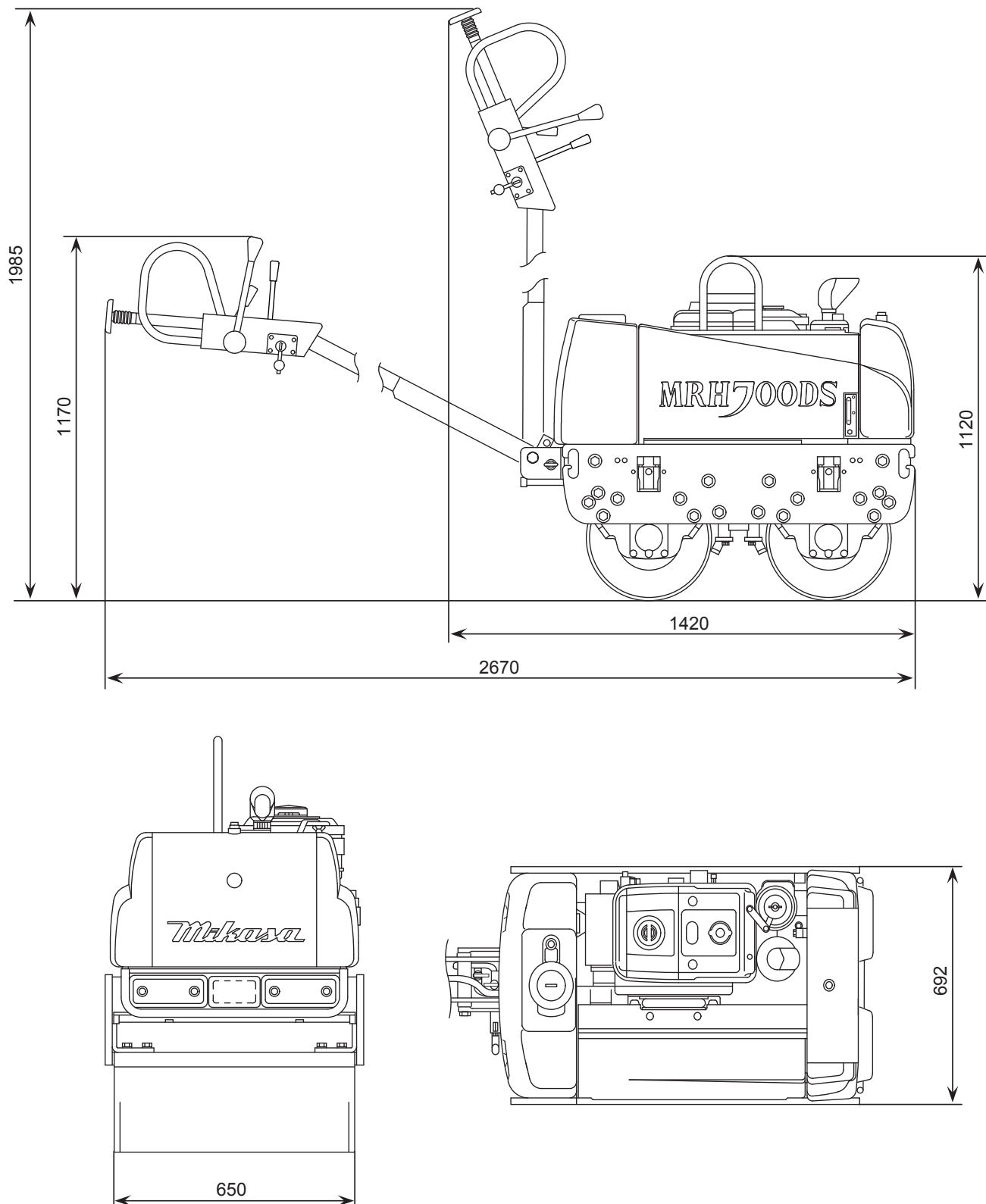


P/N 9209-00110 DECAL, SET /MVH, MRH /EXP,EU (NPA-1474, 1475, 1477, 1478)

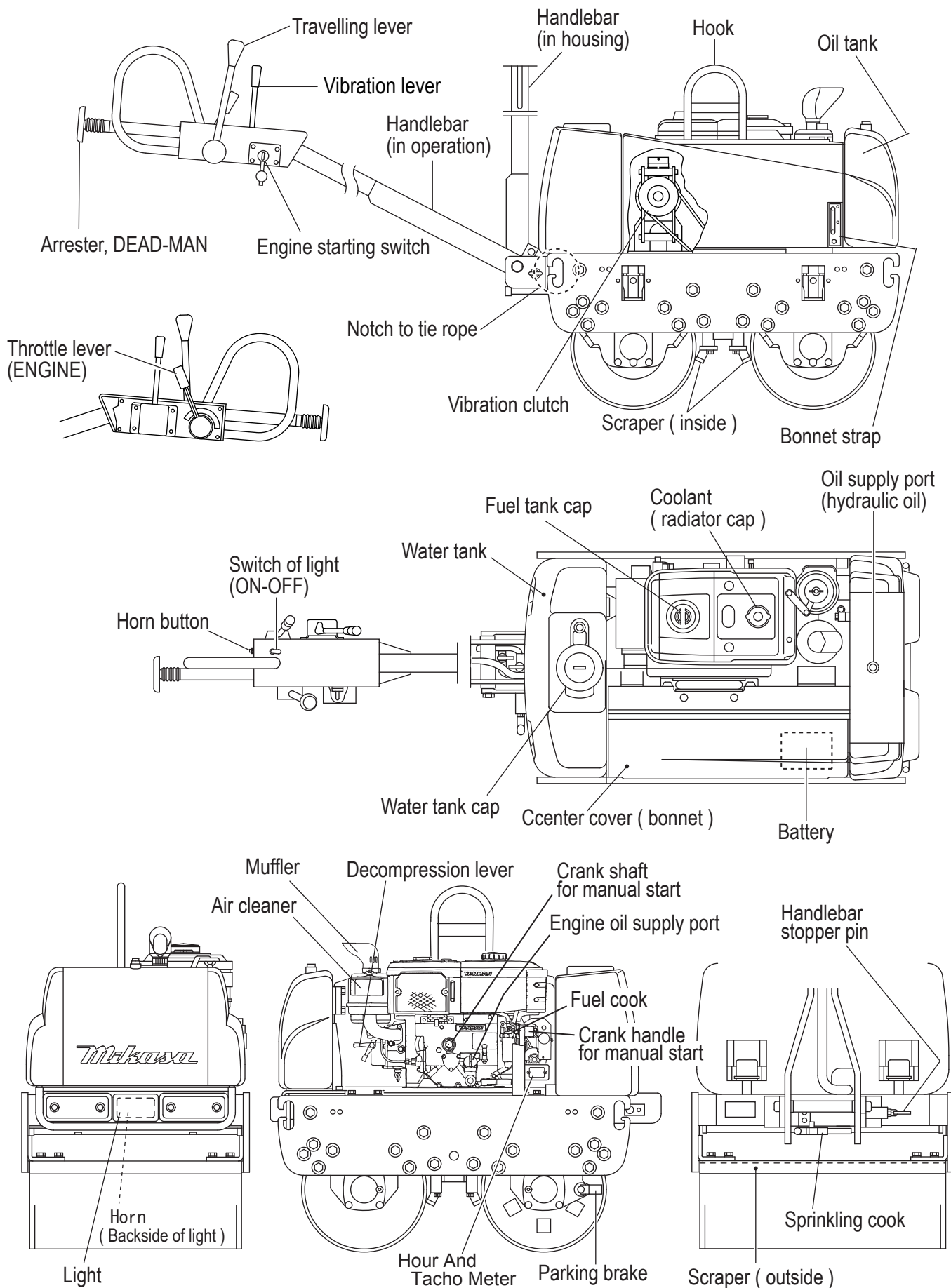
- ①  **Read the manual carefully.**
Always read the operation manual and have good understanding of operation before your work.
- ②  **Be careful not to get caught in the rotating parts.**
During operation, be careful not to have your fingers, body, clothes, etc. come in contact with the rotating parts such as the V-belt and clutch.
- ③  **Be careful not to approach danger source.**
During operation, Be careful not to approach hot parts and rotating parts.
- ④  **Refueling Hazard.**
Don't fill the fuel tank while the engine is running or hot.
- ⑤  **Fire hazard**
Stop the engine when refueling. Fire may occur if a flame is near the tank fuel port.
- ⑥  **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.
- ⑦  **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.
- ⑧  **Danger of hearing damage caused by noise**
Always use ear plugs while operating the machine.
- ⑨  **Danger: in the work in reverse**
Stand at right side or left side of Handle Bar, avoiding from standing back of
- ⑩  **Lifting by the handle is prohibited.**
Due to a falling risk, do not lift the machine by the handle.
- ⑪  **Lifting position.**
For lifting, use only one point hoisting hook, and do not lift at any other part.
- ⑫  **Operation of the parking brake.**
Display a cancellation and lock position

5. APPEARANCE VIEW

5.1 Appearance Dimension



5.2 Control Device Location And Operation Name



6. SPECIFICATION

6.1 Machine Body

M O D E L			MRH-700DSB
Body Dimension	Overall Length (in operation)	mm	2670
	(in housing)		1420
	Overall Height (in operation)		1170
	(in housing)		1985
	Overall Width		692
Drum Dimension	Drum dia	mm	406
	Drum Width		650
Distance between axes		mm	580
Weight		kg	728
Working Speed		km/h	0~3
Gradeability		% (deg)	35(20)
Vibration Frequency		Hz (V.P.M)	55(3300)
Centrifugal Force		kN (kgf)	23.5(2400)
Water Tank Capacity		L	40
Lubricating Oil		L	25

6.2 Engine

Maker		YANMAR
Model		TF70V-EKMK
Maximum Output	kw/min ⁻¹ (PS/r.p.m)	5.5/2600 (7.5/2600)
Starting System		Electric
Max.Set Speed of Rotation		2500

6.3 Hydraulic Pump

Maker	DAIKIN
Model	PV 10

7. INSPECTION BEFORE OPERATION

CAUTION Check your roller with engine stopped. Open center cover and support it with strut by inserting its end to the hole in the base. See Figs. 1 and 2.

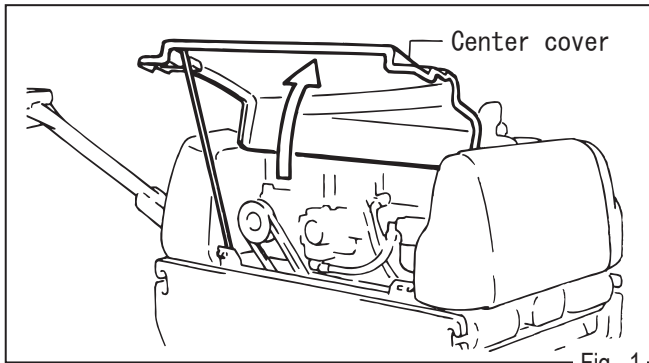


Fig. 1

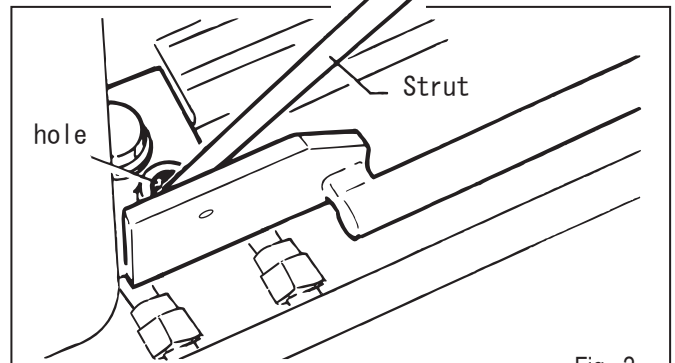


Fig. 2

Check each part before work

Check point	Check item
Visual inspection	Crack, Skewness
Hook	Falling off, Breakage, Crack, Looseness and falling off of bolt & nuts
Fuel tank	Leak, Quantity of oil, Dirt
Fuel system	Leak
Engine oil	Leak, Quantity of oil, Dirt
Coolant	Leak, Quantity of water
Oil tank	Leak, Quantity of oil, Dirt
V-belt for vibrator	Crack, Tension
Fan belt	Crack, Tension
Oil pressure pipe line system	Leak, Looseness, Crack, Abrasion
Horn	Operation check
Head light	Lighting check
Traveling lever & part of rink system	Falling off, Breakage, Crack, Looseness and falling off of bolt & nuts
Operation of traveling lever, rink origin	Operation check, Permissible error
Arrester, DEAD-MAN	Operation check
Scraper	Curve, Damage, Adjustment
Bolt, nuts	Looseness, Falling off

The check is details of engine is referred to engine instruction manual independently.

7.1 Hydraulic System (Fig.3)

- Check oil tank level gauge and make sure that oil is up to specified level (middle of the gauge). At the time of shipment, it is filled with Idemitsu Duffny Super Hydro 46ST (25 liters).
- Check oil tank, oil pump, oil motor and hose joints for any leakage.

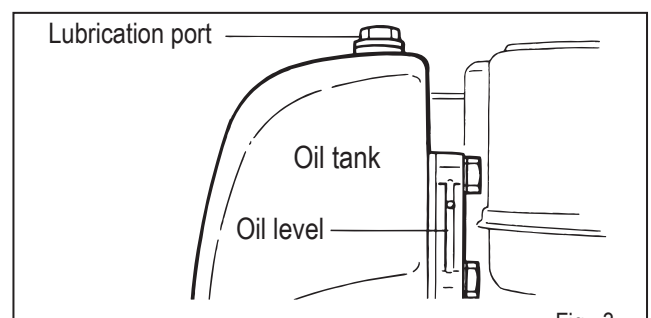


Fig. 3

7.2 Engine (Fig.4)

- Check engine oil for proper level
- Check engine coolant for proper level (See separate Engine Instruction Manual for details.)

DANGER
Be sure not to remove radiator cap while engine still warms. Remove Cap after engine is cooled down enough.

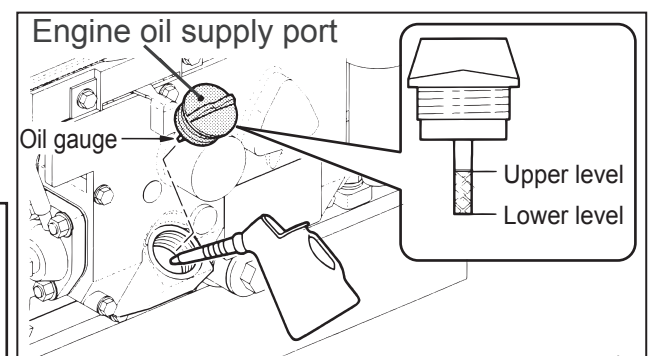


Fig. 4

7.3 Vibrator Unit

- With center cover opened, check V-belt for proper tension. With insufficient tension, vibration does not transfer sufficiently. (Fig.5)
- Check vibrator casing for any oil leakage. If any leakage is noticed, check the oil level with level plug removed off the side plate. (Fig.6)

Warning Please do check the belt after stopping engine by all means. Keep hand and clothes away from rotating part (belt, pulley, etc.).

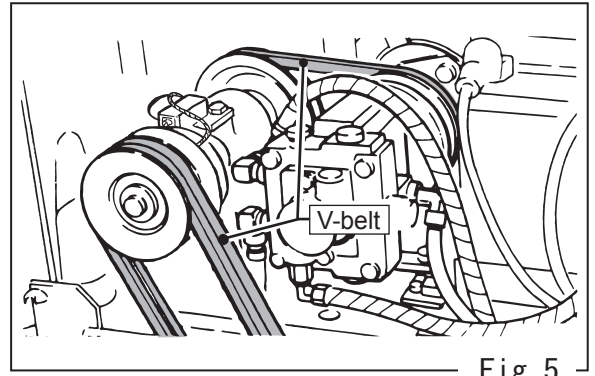


Fig. 5

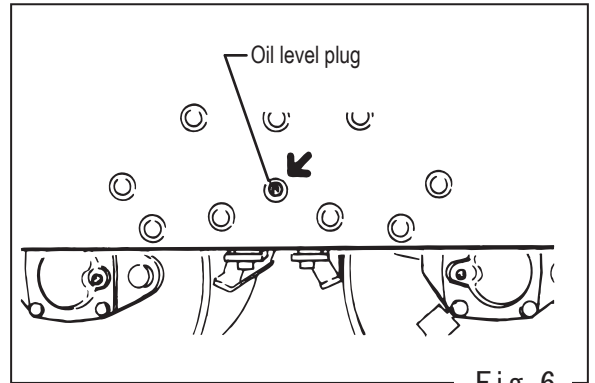


Fig. 6

7.4 Operation Device

- Check each lever and wire (travel, vibration, throttle) for proper function.(Fig.7)
- With travel lever placed in reverse, push Arrestor, DEAD-MAN to verify that travel lever returns to neutral position. (Fig.8)
- Travel Lever returns to neutral position automatically if lever is released. (CE type)
- Press horn button to check for proper function. (Fig.7)

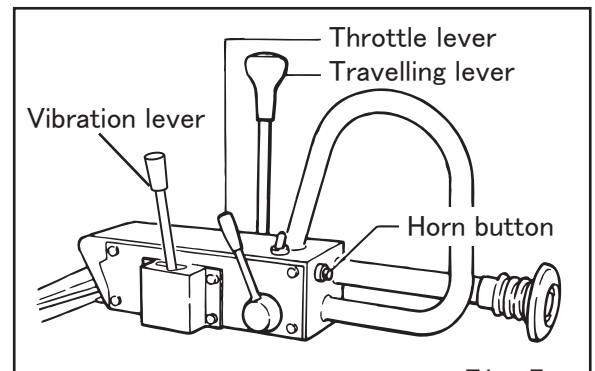


Fig. 7

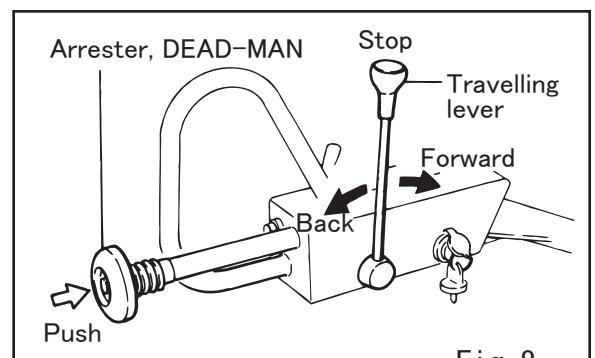


Fig. 8

7.5 Water Sprinkler System

- For watering work, fill water tank in the back with water. Its capacity is 40 liters. (Fig.9)

CAUTION: Be careful not be confused with oil tank.

- Open the cock of front & rear drums, and please confirm the water flow.

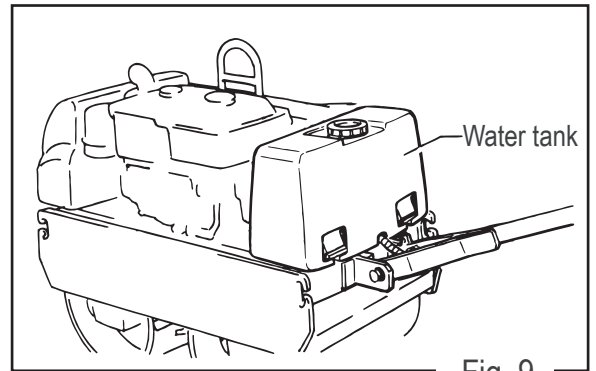


Fig. 9

7.6 Scraper on Each Drum (Fig.10)

- Check to see if it is not clogged with mud, bent or damaged in any other way.
- Adjust clearance between drums and scrapers as necessary.

7.7 Others

- Check bolts, nuts and screws on each part of machine (including engine) for proper tightness.

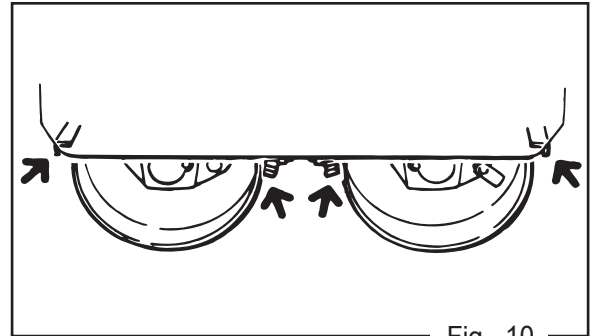


Fig. 10

8. OPERATION

8.1 Starting Up

- Align throttle lever with the position for Operation.
 - Travel lever should be in neutral and vibration lever in OFF positions.
 - Open fuel cock.
- a. Insert the key into the key switch and turn the key to "ON" (Operation) position. Make sure that a buzzer goes off when the key is turned to ON.(Fig.11)
The buzzer starts. After "YA" is displayed on hour tachometer, the display will change immediately to "Cumulative time".(Fig.12)
 - b. Stop the key at "GL" (Preheat) position to preheat for 5 seconds. (With the key at "GL" position, the glow lamp next to the horn button lights up for five sec., then it will go out.)(Fig.11)
 - c. After preheating, turn the key further to the right to "ST" (Start) position. Starter will run to start the engine. Immediately after the engine is started, take your hand off the key.(Fig.11)
After the engine revolution has increased, the buzzer will stop. Because a safety status switch is installed, the cell motor will not run unless the driving lever is at the stop position.
 - d. "Rotation number" is displayed during operation. (Fig.13)

- It is only after the engine rotation is stopped that you can use the key switch. When repeating key operation more than three times, take about one minute break before restarting.
- While the engine is running, never try to set the key switch to "ST" position.
- In case if a wire or a strap is attached to the key, it might happens that the key does not move back from the (Start) position, resulting in cell motor burnout by overrun.
- When starting with the cell motor, normally, there is no need to use decompressor. However, you may use the decompressor for easy starting when the temperature is low or the battery is getting weak.

- After starting, continue warm-up run for about 3 to 10 minutes. In cold weather particularly this warm up is essential. Check for gas leakage or any abnormal noise during this interval.
- If buzzer does not cease to sound after engine has started, shutdown engine immediately and check engine oil level. This buzzer has the function of engine oil warning as well.
- Please confirm that horn sounds.
- Please confirm that a headlight lights.

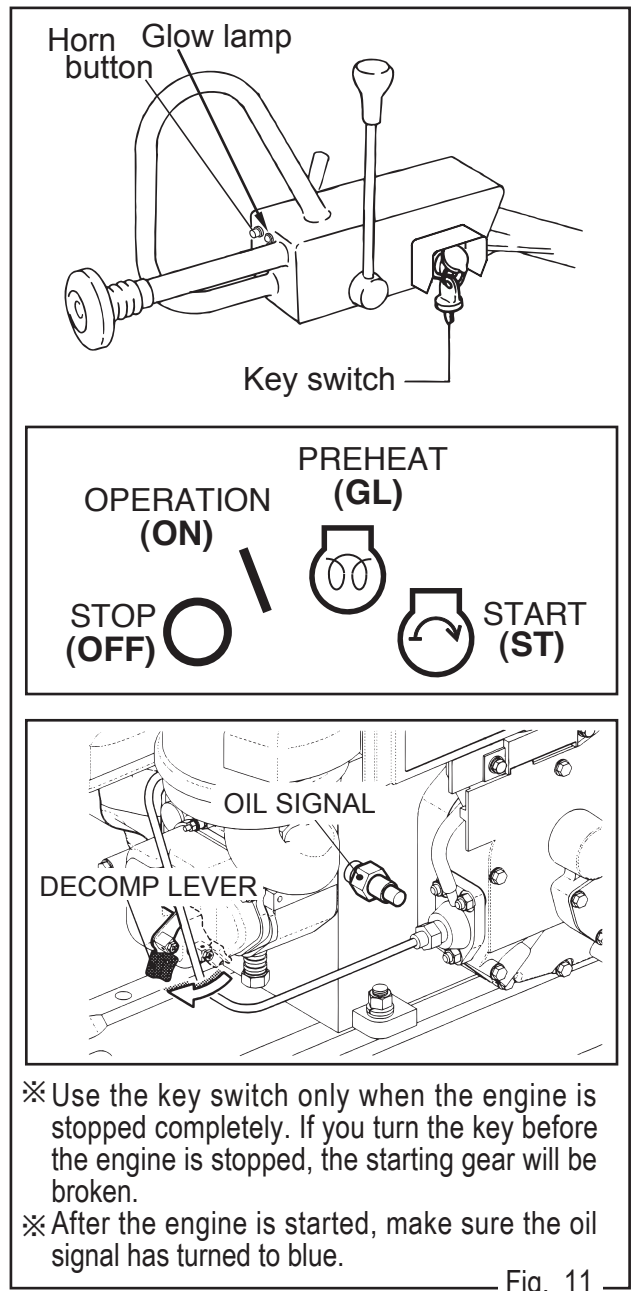


Fig. 11

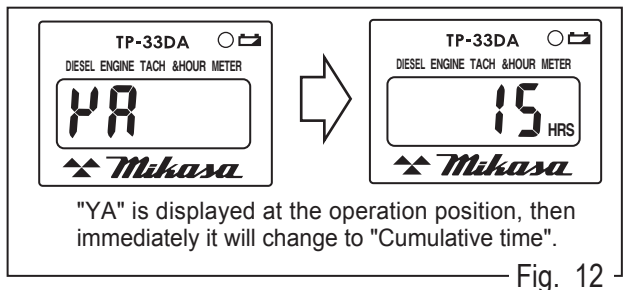


Fig. 12

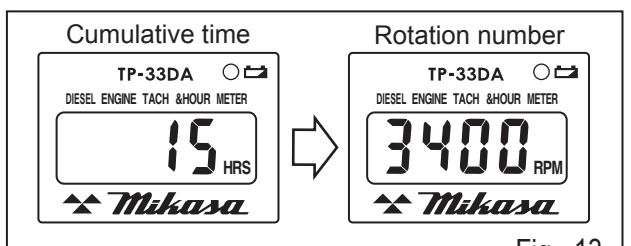


Fig. 13

8.2 Traveling

- With throttle lever fully opened, increase the engine rotation. (Fig.7)
- Pushing travel lever slightly forward, causes the roller to travel forward at micro speed. Pushing it further, increases the travel speed. Depending on how you move the travel lever, travel speed can be varied steplessly between 0 and 3 km/h (for both forward and reverse). Pulling the lever back causes the roller to travel backward. (Fig.8)

CAUTION: Before starting to travel, be sure to disengage parking brake system. When the lever is tight, moving the roller back and forth will make it easier. (Fig.14)

- During work, do not reduce engine speed.
- When shifting travel lever from forward to reverse, be sure to stop the lever at neutral position once. Do not shift it all the way in one motion.



WARNING:

After test travel, shutdown engine to check for any abnormality including oil leakage. If any trouble should be found, do not operate the roller before it is completely corrected.

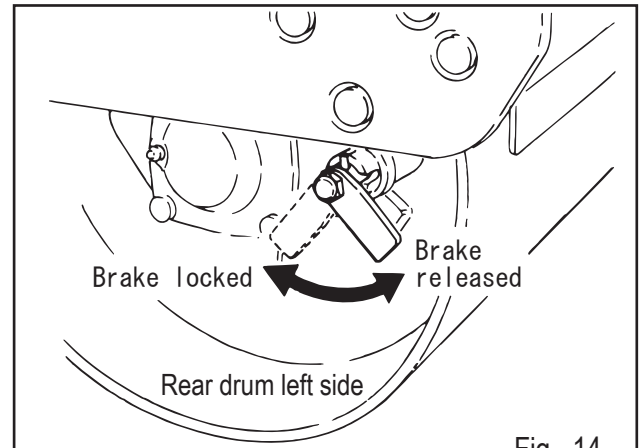


Fig. 14

8.3 Vibration (Fig.15)

- Shifting vibration lever away from its neutral position causes the roller to start vibrating. When disengaged from neutral slot, the vibration lever will fall forward automatically with spring force.

CAUTION: Using the vibration with clutch slipping, causes the clutch to burn. Also, vibration should not be used over completely compacted area, paved road surface or with the roller standing still.

In the case of next, please do not vibrate.

- When do not travel
 - The place that fully hardened
 - In road surface after paving work
- Machine or the road surface is damaged.

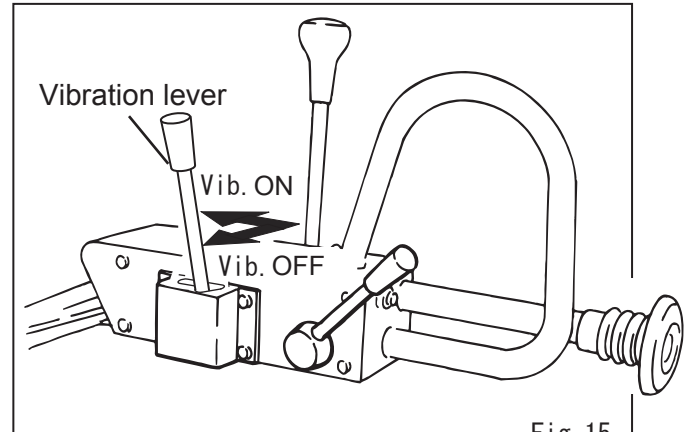


Fig. 15

8.4 Watering Work (Fig.16)

- For sprinkler work, open the cock at the rear of the body.

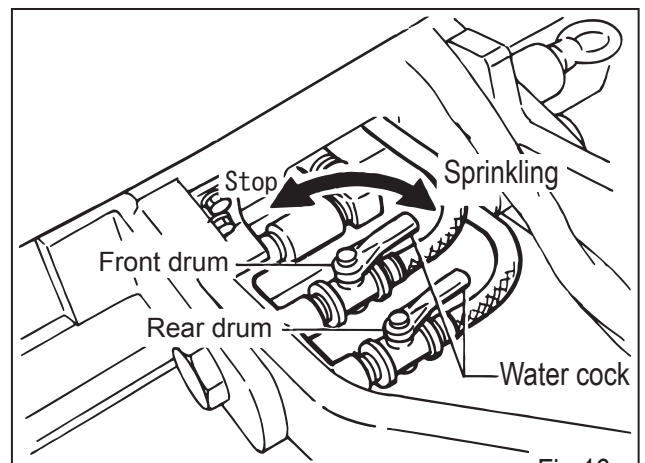
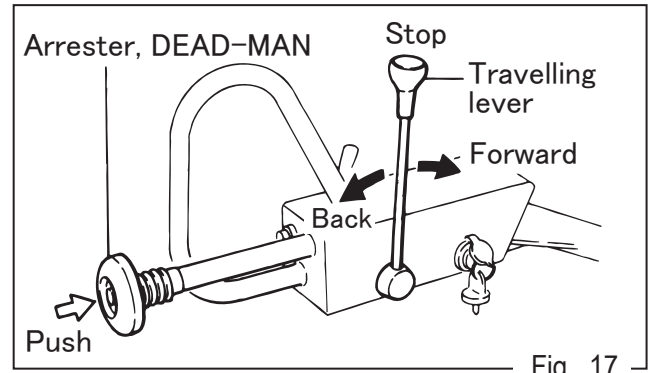


Fig.16

8.5 Safety System

- Klaxon (horn) is provided.
- Pressing Arrester, DEAD-MAN provided while traveling in reverse, causes travel lever to return to neutral position to bring the machine to stop. (Fig.17)

! DANGER: When operator be sandwiched in between DEAD-MAN Arrester and obstacle, do not continue grasping the traveling lever in back position. Roller continues reversing, and it will hurt operator. When operator is wedged between, release your hand from traveling lever. Or move traveling lever to "STOP" position (or "FORWARD" position).



8.6 Others

- Using the roller in combination with plate compactor (MIKASA MVC-F60 etc.) allows you to finish asphalt surface in high efficiency.

9. STOPPING THE OPERATION

- With travel lever and vibration switch placed in neutral and OFF position respectively, return throttle lever to START position before conducting cool down run for 3 to 5 minutes. (Fig7, 8 and 15)
- Returning the throttle lever forward causes the engine to stop. In case of starter motor type, return the key switch to STOP position also as soon as engine stops. (Fig12)
- Before leaving the machine, remove the key and keep it to designated place.

CAUTION: Neglecting to return the key switch to STOP position causes the battery to discharge, making impossible to start-up next time. (When does not turn the key into "stop" position, it gives the sound of buzzer.)

- After having stopped, close the fuel cock.
- Lock the parking brake by pulling the brake knob and rotating it 90 degrees counter clockwise. (Fig. 14)

! Parking brake system should always be kept clean avoiding from mud depositing.

! DANGER: When parking in the slope, turn the traveling lever into "STOP" position, and also move calmly to the position that parking brake locks. (Parking brake is in the rear wheel drum left side.) After having confirmed lock of parking brake, turn traveling lever into stop, stop the engine, and use the ring stopper. Select suitable ring stopper from slope condition. There is fear to run uncontrollably when does not follow process.

10. MACHINE TRANSFER AFTER ENGINE STOPS

⚠ WARNING: Besides emergency, do not take the next operation. There is fear to cause serious obstacle or death accident when takes the wrong handling.

Unloading procedure (Fig.18 and 19)

- After stopping engine, if you have to move the roller by pushing it manually, loosen bolt of by-pass valve on oil pump by one rotation, which will cause hydraulic brake to be disengaged so that you can move it with less effort.
- After moving, do not forget to tighten the bolt back again. Tightening torque is 55 to 70 kgf-cm.

⚠ WARNING: Be careful with the handling of tightening torque.
Do not tighten much, because it damage needle-valve, and leak a hydraulic oil.
When a hydraulic oil does leak, there is danger to run by itself even loose slope. In addition, performance deteriorates in driving, and there is the fear that operator becomes dangerous.

⚠ CAUTION: Never tow this roller by means of vehicle or the like. It will damage hydraulic system.

⚠ WARNING: Never conduct this unloading procedure on slope. It may cause the roller to roll down with its own weight if parking brake or blocking is deficient.

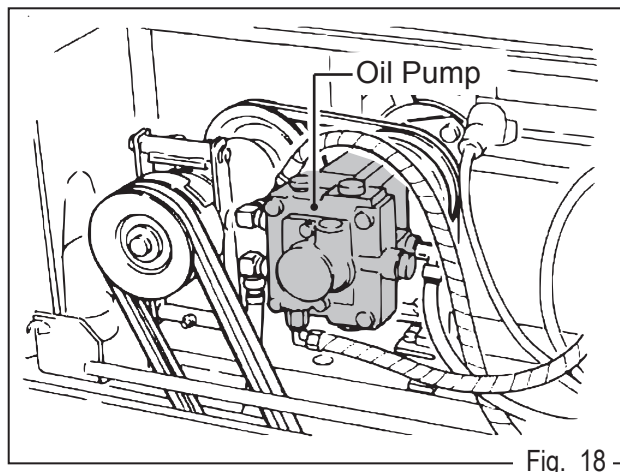


Fig. 18

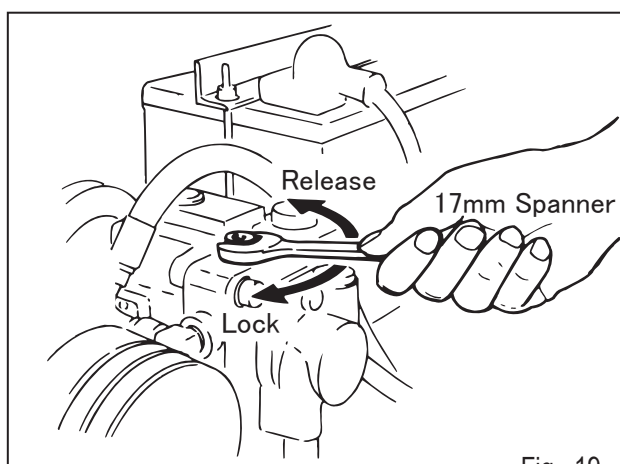


Fig. 19

11. SERVICE AND STORAGE

11.1 Scraper Cleaning

Wash down dust and dirt off the machine. Area around drums and scrapers should be cleaned with particular care, as lodged mud will present resistance.

11.2 Water Tank Drainage

Drain water tank completely using outlet.

11.3 Short Term Safekeeping

Cover the machine to prevent dust and store it in dry place, not exposed to sun.

11.4 Long Term Storage

- Conduct lubrication and oil change thoroughly.
- For battery, disconnect terminals or dismount it from the roller for storage.
- Where ambient temperature may drop below freezing point, add anti-freeze solution to coolant.
- Cover the inlet and outlet of air cleaner and muffler securely.
- Store it inside building, not leaving it outdoor.

12. PERIODIC CHECK AND COORDINATION

12.1 Each Part Check Schedule List

Check schedule	Check point	Check item	Type of oils and fats
Daily (before work)	Visual inspection	Crack、Skewness	
	Fuel tank	Leak、Quantity of oil、 Dirt	Light oil
	Hook	Falling off、Breakage、Crack Looseness & falling off of bolt & nuts	
	Fuel system	Leak	
	Fuel filter	Dirt	
	Engine oil	Leak、Quantity of oil、 Dirt	Engine oil
	Oil tank	Leak、Quantity of oil、 Dirt	Hydraulic oil
	V-belt for vibrator	Crack、Tension	
	Oil pressure pipe line system	Leak、Looseness、Crack、Abrasion	Hydraulic oil
	Horn	Operation check	
	Head light	Lighting check	
	Traveling lever & part of rink system	Falling off、Breakage、Crack Looseness & falling off of bolt & nuts	
	Operation of traveling lever, rink origin	Operation check、Permissible error	
	Arrester, DEAD-MAN	Operation check	
	Scraper	Curve、Damage、Adjustment	
	Bolt, nuts	Looseness、Falling off	
20 hours	Engine oil	Only first time	Engine oil
	Engine oil filter	Only first time	
Every 50 hours	Bearing of drum	Supply of oils and fats	Grease
	Traveling lever corollary part	Supply of oils and fats	
	Lever for hydraulic pumps	Supply of oils and fats	
	Auto. stop device (DEAD-MAN Arrester)	Supply of oils and fats	
	Handle stopper	Supply of oils and fats	
	Parking brake	Supply of oils and fats	
	Filter for hydraulic oils	Exchange only first time in 50 h	
Every 100 hours	Engine oil	Exchange	Engine oil
	Battery terminal	Cleaning	
300 hours	Vibrator oil	Exchange	Engine oil
500 hours	Filter for hydraulic oils	Exchange	
1000 hours	Hydraulic oil	Exchange	Hydraulic oil
Irregular time	Air-cleaner element	Exchange	
	Hydraulic hose	Exchange	
	Electro-magnetic Clutch	Exchange (Limited Gap 0.7mm)	

Refer the attached engine instruction manual about the details of check & maintenance for engine.

12.2 Engine

For daily check/regular check and easy adjustment /maintenance of the engine, please refer to the separate engine handling instruction.

⚠ DANGER: Always stop the engine first before starting your work.

● Engine oil (Fig.20)

1. Check the oil level to see if it is inside the two markings (2) of the gauge (1). If the level is low, add some oil.
2. Drain engine oil while the oil is still warm by removing the oil strainer at the bottom surface of the engine.
3. Clean the oil strainer before reassembling it.

Engine oil capacity : 2.0 L

Recommended engine oil:

**SAE10W-30 (-20~30°C)
SAE15W-40 (-15~40°C)**

● Air cleaner (Fig.21)

1. Take out the air cleaner element from the air cleaner.
2. If the element is dirty with dry dust or dirt, blow it off by sending compressed air from inside in up/down motion.
3. If the element is dirty with carbon or oil, use mild detergent to clean.
4. Change the element every year or every six cleanings.

※ When cleaning the element with compressed air, the air pressure should be below 0.19 MPa (2.0 kgf/cm²)

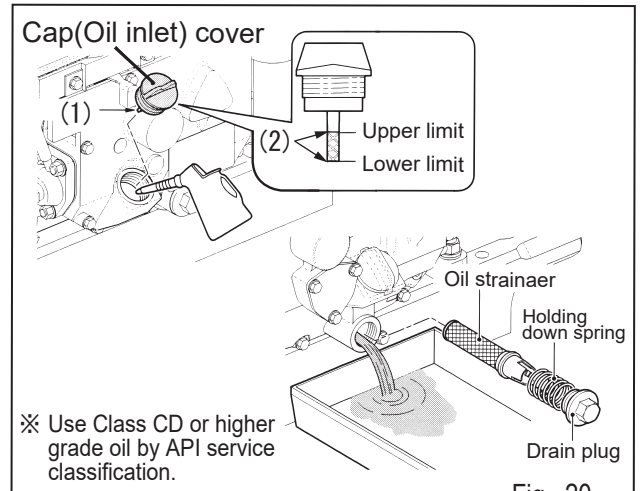


Fig. 20

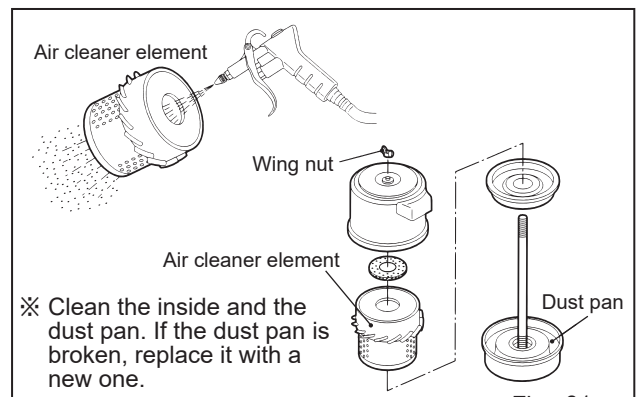


Fig. 21

● Fuel filter (Fig.22)

⚠ DANGER: Keep fire away

1. Shut the fuel filter cock.
2. Remove the retainer ring (2) at the top of the cup to take out the filter cup (3) and the element (1).
3. Wash inside the cup with light oil, and attach a new filter element.
4. To prevent dust and dirt from attaching and also to prevent fuel leakage, tighten the retainer ring, then open the filter cock to release air.

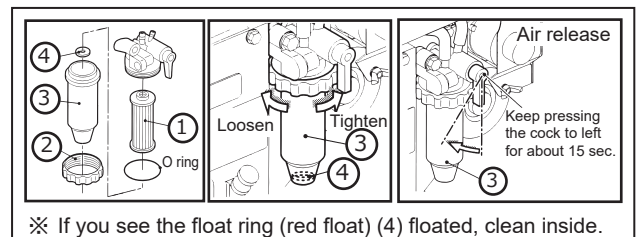


Fig. 22

● Fan belt (Fig.23)

⚠ DANGER: Watch out because your fingers might get caught.

1. Press down the fan belt (middle point between the fan drive pulley and tension pulley) with a force of 49 N (about 5 kgf) to check the amount of deflection.
2. If the deflection is not within the standard value, adjust it with the tension pulley lever tightening bolt.
3. Visually check the belt. If the outer skin is ripped, cracked or any change is observed, replace it with a new one. Also, if the belt is worn and it is touching the bottom of the pulley, replace it, too.

※ Keep the fan belt away from oil. If oil is on the fan belt, the belt becomes slippery and expands easily.

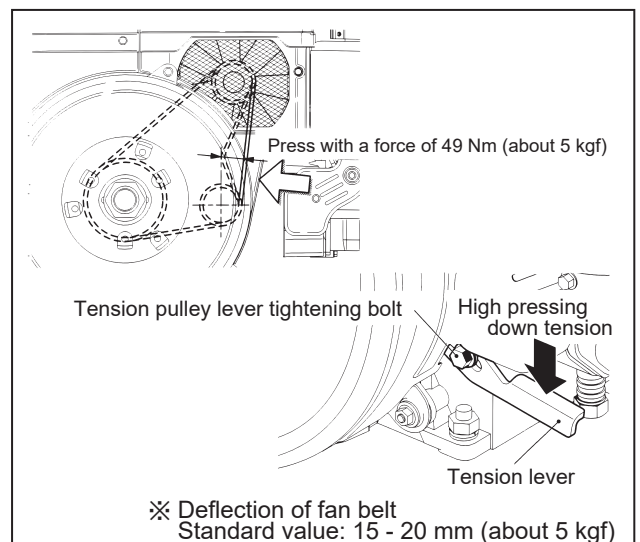


Fig. 23

● Cooling water (Fig.24)



DANGER: During operation or immediately after operation, the cooling water is very hot. Open the cap after operation is stopped and the radiator is sufficiently cooled.

1. Remove the radiator cap to check if the cooling water is at the tip of the cap.
2. If the level of cooling water is low by evaporation, supply fresh water. In case of cooling water leakage, mix the antifreeze from the same manufacturer before supplying fresh water. (For handling of antifreeze, refer to the handling instruction of the manufacturer.) Do not mix the antifreeze from different manufacturer.
3. For cooling water, mix drinking water (tap water) with conditioning agent or antifreeze (long life coolant). Do not use conditioning agent and antifreeze at the same time.
4. When draining the cooling water, remove the water drain plug at the bottom of the radiator.

※ **The ingredients of antifreeze also deteriorate. Please change the cooling water once a year.**

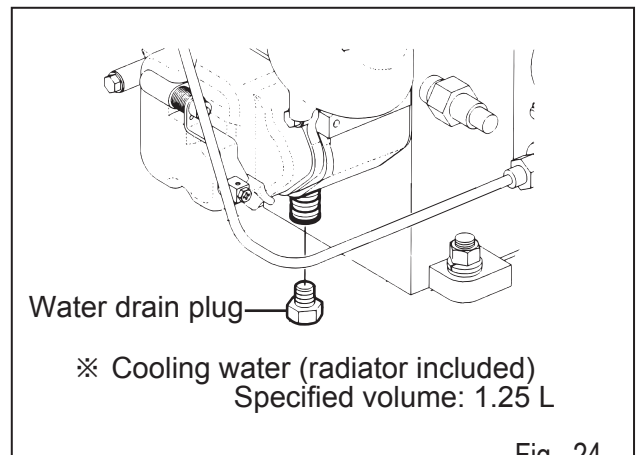


Fig. 24

12.3 Main Body

Do check and maintenance in accordance with an each part check schedule list of 19 pages.
Each refueling port refer to 25-26 pages.

12.4 Neutral Adjustment of Travel Lever (Fig.25)



CAUTION: Be sure to shutdown engine before proceeding with any adjustment.

- If neutral position for forward and reverse travel has been displaced, conduct the neutral adjustment.
(When have traveled in engine starting)
- If roller travels forward with the ball of ball plunger remaining in V slot of the guide, loosen M8 bolt and slide the slide plate slightly toward engine (away). If it travels backward, slide the slide plate toward side plate (back).
- With M8 bolt tightened, start engine and check the neutral for forward and reverse. If still displaced, repeat the procedure.
- In case neutral position of forward/reverse lever has been displaced, use the turn buckle located on the oil pump side of forward/reverse cable.

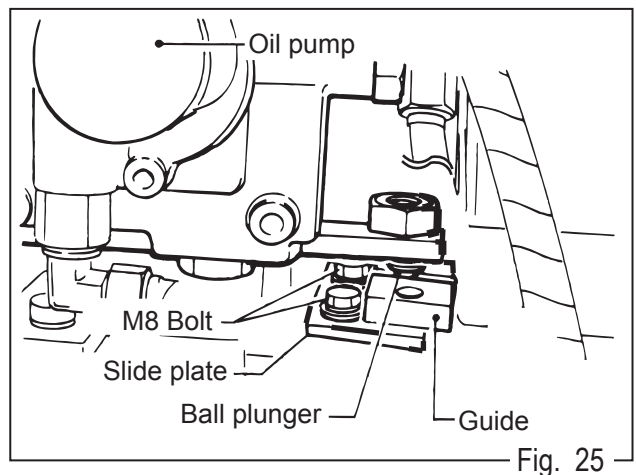


Fig. 25



WARNING: The grease lack or rust outbreak or damage of ball plunger is means heavy movement of the traveling lever, and produce malfunction of a traveling cable, and there is fear to cause a serious accident.
Always check so that malfunction of ball plunger does not happen. And do maintenance of grease-up etc.

12.5 Check of Battery Power

! CAUTION: Fire is absolutely prohibited during battery inspection as Inflammable gas generated from battery may catch fire to explode.

● Servicing the battery

Looseness or corrosion of terminal leads to deficient contact. When white powder is noticed at terminal, clean it with lukewarm water before coating with grease.

If corrosion is substantial, polish with wire brush or sand paper and tighten securely not to allow any more looseness before applying grease.

● Dismounting and remounting of battery (Fig.26)

For dismounting, disconnect with negative terminal first. For mounting, connect positive terminal first, followed by negative terminal.

● Battery inspection:

(External appearance check only for maintenance free type battery)

Check battery for crack or any other damage, If white pattern appears (sulfation) inside the battery or paste has accumulated at bottom, replace the battery with new one.

SPECIFIC GRAVITY: Use hydrometer to measure specific gravity of electrolyte and if it is below 1.230, charging is required.

Completely charged: 1.270 -1.290

Lack of charging : 1.260 or lower

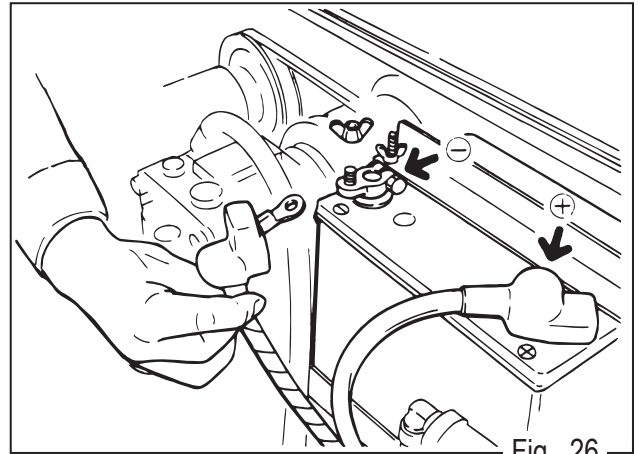


Fig. 26

! CAUTION: When connecting the cables, definitely do not cause positive and negative terminals to short circuit. Connecting positive and negative oppositely, may expose electric component to damage.

! CAUTION: Electrolyte being a strong chemical, care should be taken for its handling. If it has gotten on skin, eyes, or clothing, wash down with plenty of water and see doctor.

12.6 Check and Maintenance of Hydraulic System

Inspection (Figs.18 and 27)

- Check motor and pump for any damage.
- Check hoses and pipings for proper tightness and make sure that there is no leakage.
- Checking Nylon tubes for hydraulic oil intake and drain:
Retighten brass nut if it is loosened and leakage is noticed around. If the leakage continues after retightening, replace the Nylon tube, nut and sleeve with a set of new ones.
- Check oil tank for proper oil level and see if the hydraulic oil has not been whitened or emulsified.
Its whitish color means aeration in pump. Re-tighten piping and correct the level of oil. Emulsification means water in the hydraulic oil. Replace the oil.

Maintenance

a) Oil filter replacement (Fig.28)

Initial replacement: After 25 hours of operation

Thereafter: In every 500 hours of operation

CAUTION: Use genuine Mikasa filter paper with 10 microns only. Replace it if suction resistance has exceeded 254mmHg. (at operating temperature of 60 degrees C)

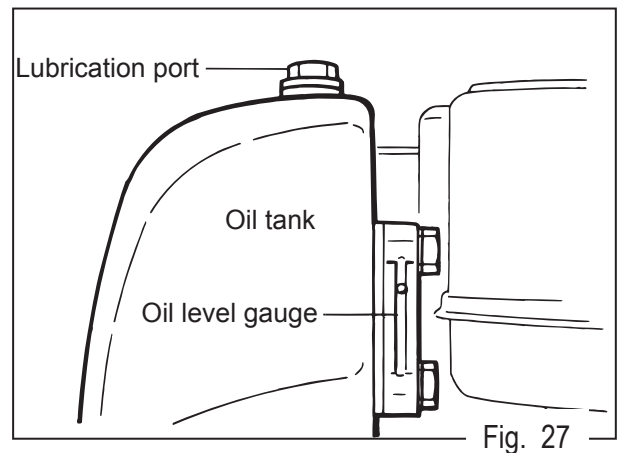


Fig. 27

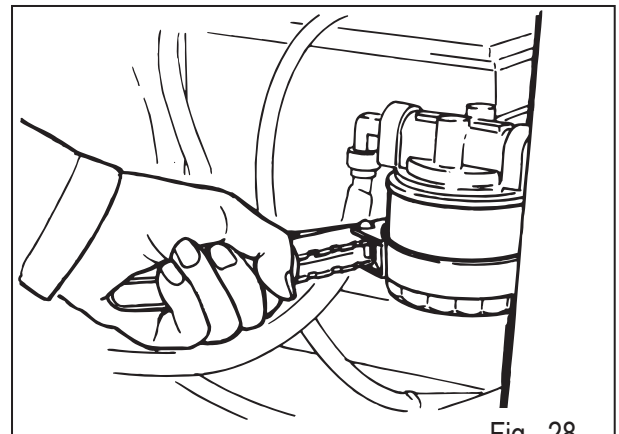


Fig. 28

b) Hydraulic oil replacement

Though it depends on load, normally it should be replaced in every 1,000 to 1,500 hours of operation. Remove drain plug off oil tank and hose joint to drain old oil before refilling it with 25 liters of recommended oil. Use care not to allow dust, foreign matter or water to enter.

CAUTION: Dispose of the oil which pulled out as the appropriate waste done regulations of.

Recommended wear resistant hydraulic oil:

Viscosity: ISO VG32 equivalent, for cold region
ISO VG46 or 56 equivalent, for general and warm region

(At the factory shipment, machine is filled with Idemitsu Duffny Super Hydro 46ST.)

Installation

a) 1/4 (pipe thread) hydraulic hose tightening torque:250kg-cm

b) 1/4 (pipe thread) hydraulic hose tightening torque:380kg-cm

c) Installing the Nylon tube (Fig.29)

- Insert nut and sleeve to the Nylon tube.
- Nylon tube should extend from sleeve end by about 10mm.
- Insert the Nylon tube straight all the way into connection of the joint.
- With the Nylon tube thus inserted, tighten nut fully with fingers. Then, tighten it further with wrench to leave 1 -1.5cm of thread of joint remaining.
(Tightening torque: 100 -140kg-cm)

12.7 Vibration Clutch Adjustment (Fig.30,31)

For adjusting vibration clutch,with vibration lever on handle side placed in OFF position, loosen the nuts (front and back) at the end of vibration clutch cable. Then turn-in the nut on front side again and from such position where release fork starts to move, turn-in the nut by one or two threads and lock it right there together with the nut on back side.

Turning-in the front side nut excessively may cause the sliding engagement of clutch to take place or no vibration to take place even when vibration lever is engaged.

If on the contrary, its insufficient turning-in may cause sliding engagement of clutch even when vibration lever is placed in OFF position or vibration to remain engaged.

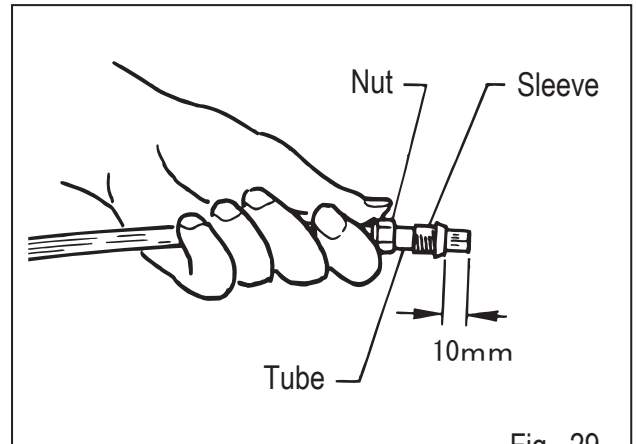


Fig. 29

CAUTION:

- Watch for insufficient depth of insertion for sleeve and Nylon tube into joint.
 - Watch for insufficient tightening of nut.
- These are the two points to be carefully watched during replacement work.

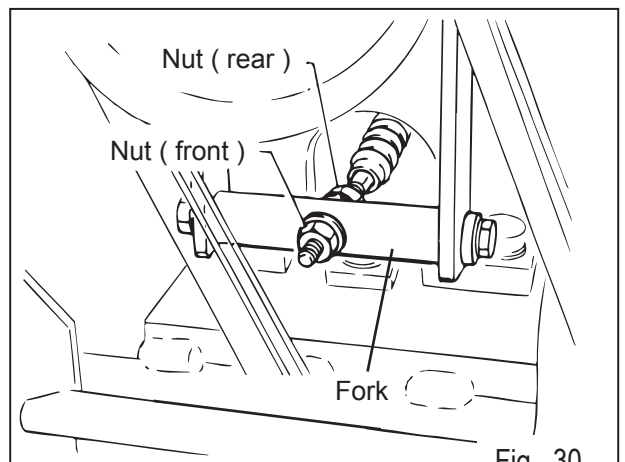


Fig. 30

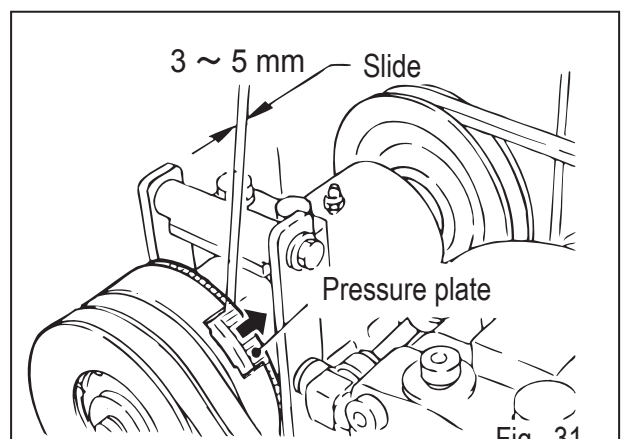
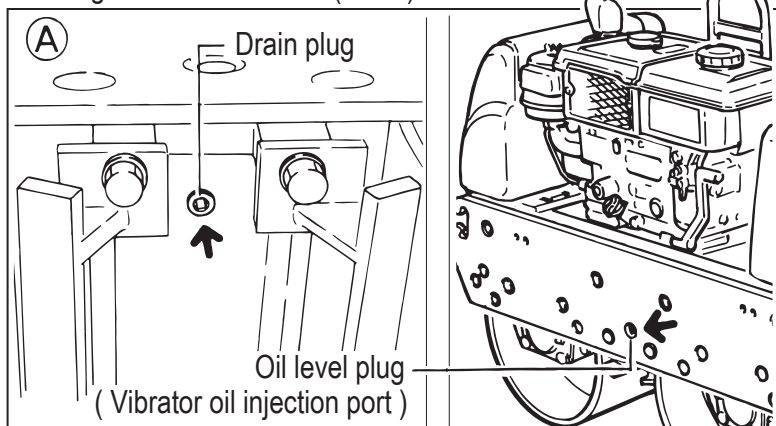


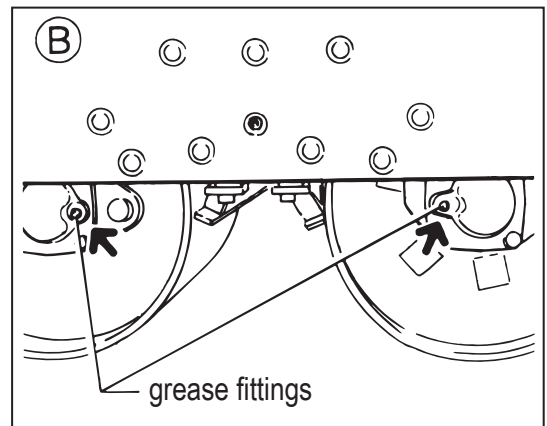
Fig. 31

13. LUBRICATION CHART

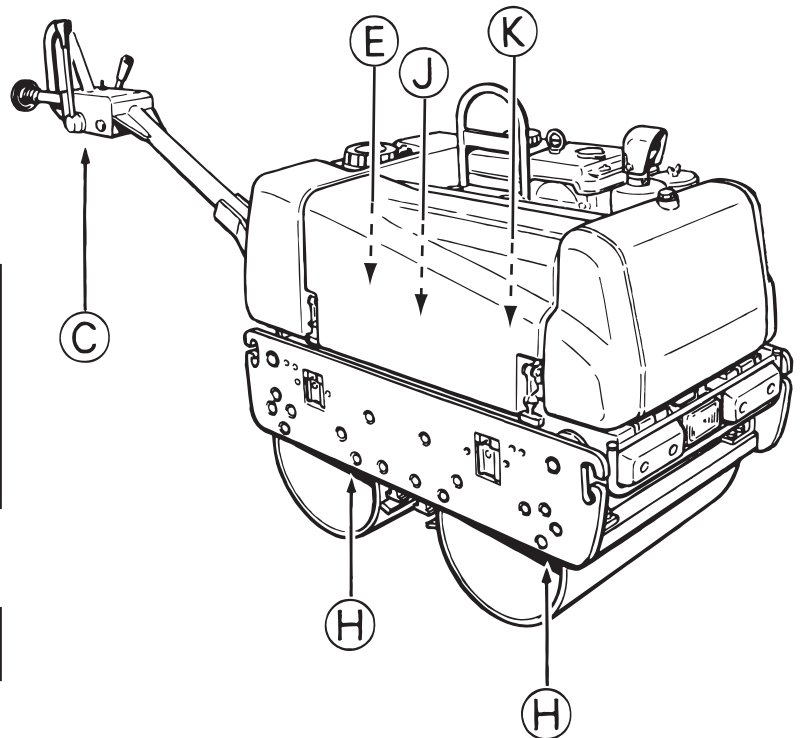
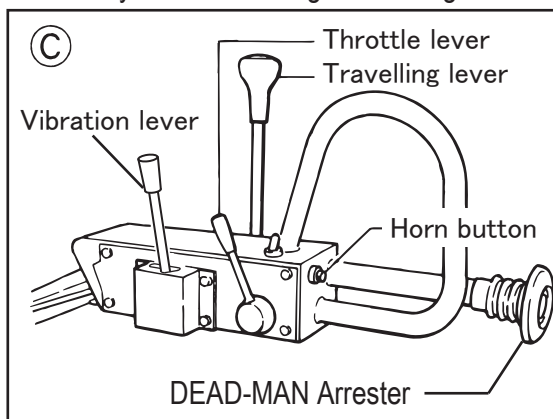
- **Vibrator oil**
every 300 hours
Engine oil SAE10W-30 (0.9L)



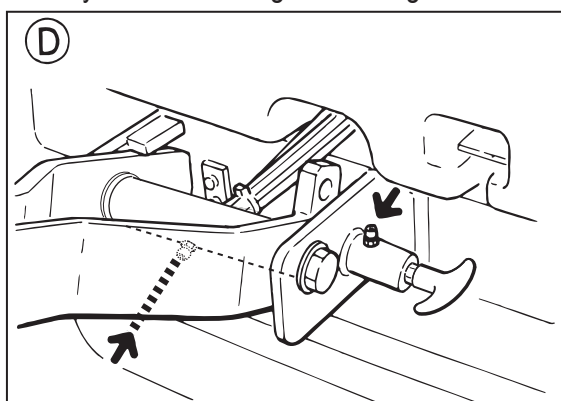
- **Bearing cover**
every 50 hours onto grease fittings



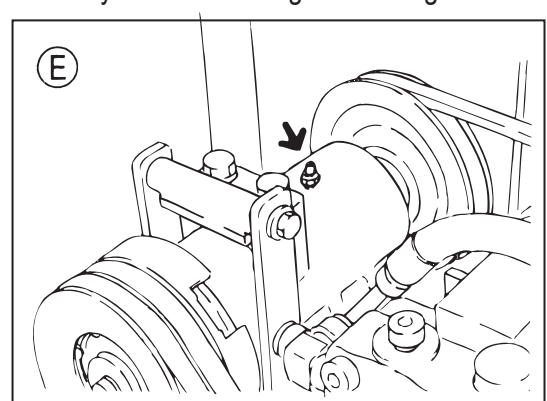
- **Traveling lever & throttle lever**
every 50 hours
(Supply sliding part with lubricating oil)
- **DEAD-MAN Arrester**
every 50 hours onto grease fittings



- **Handle stopper**
every 50 hours onto grease fittings

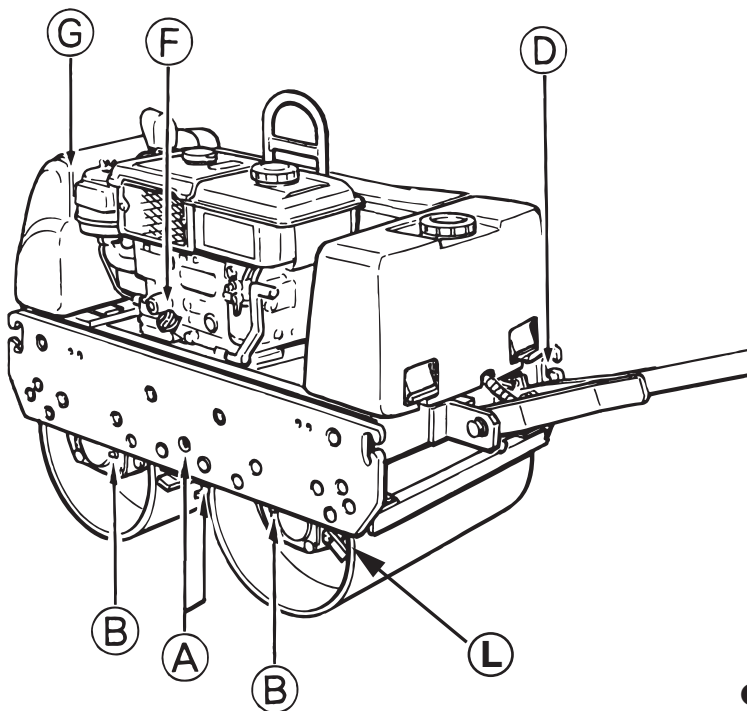
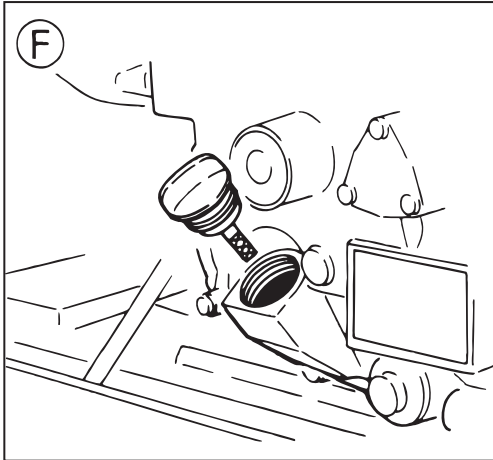


- **Counter shaft for vibration**
every 50 hours onto grease fittings

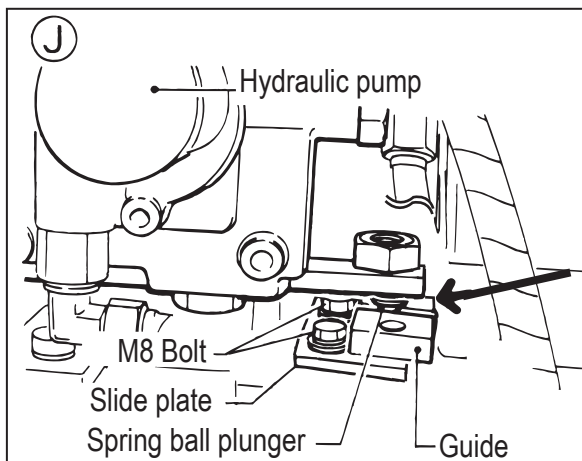


● **Replacement of engine oil**

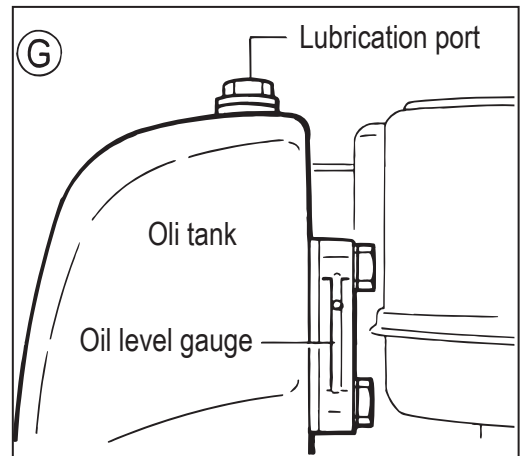
First time: 10-20 hours Afterward : every 50-100 hours
 Engine oil for Diesel CC class : SAE10W-30
 Extreme cold region (Less than -10 degrees) : SAE5W-30



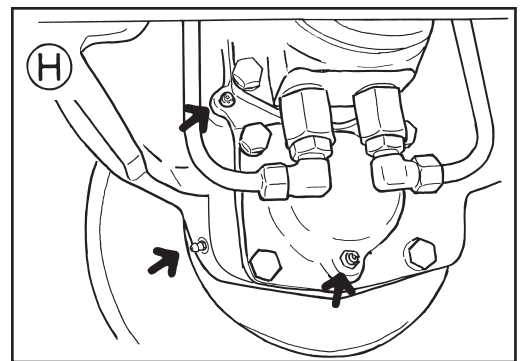
● **Spring ball plunger of lever (P V 10)**
 every 50 hours onto sliding part



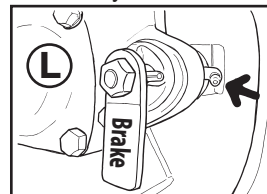
● **Hydraulic oil**
 every 1,000-1,500 hours (25 liters)



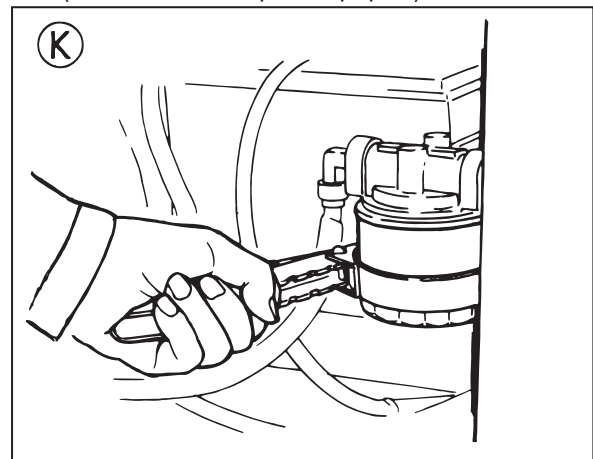
● **Bearing cover & drum bracket**
 every 50 hours onto grease fittings



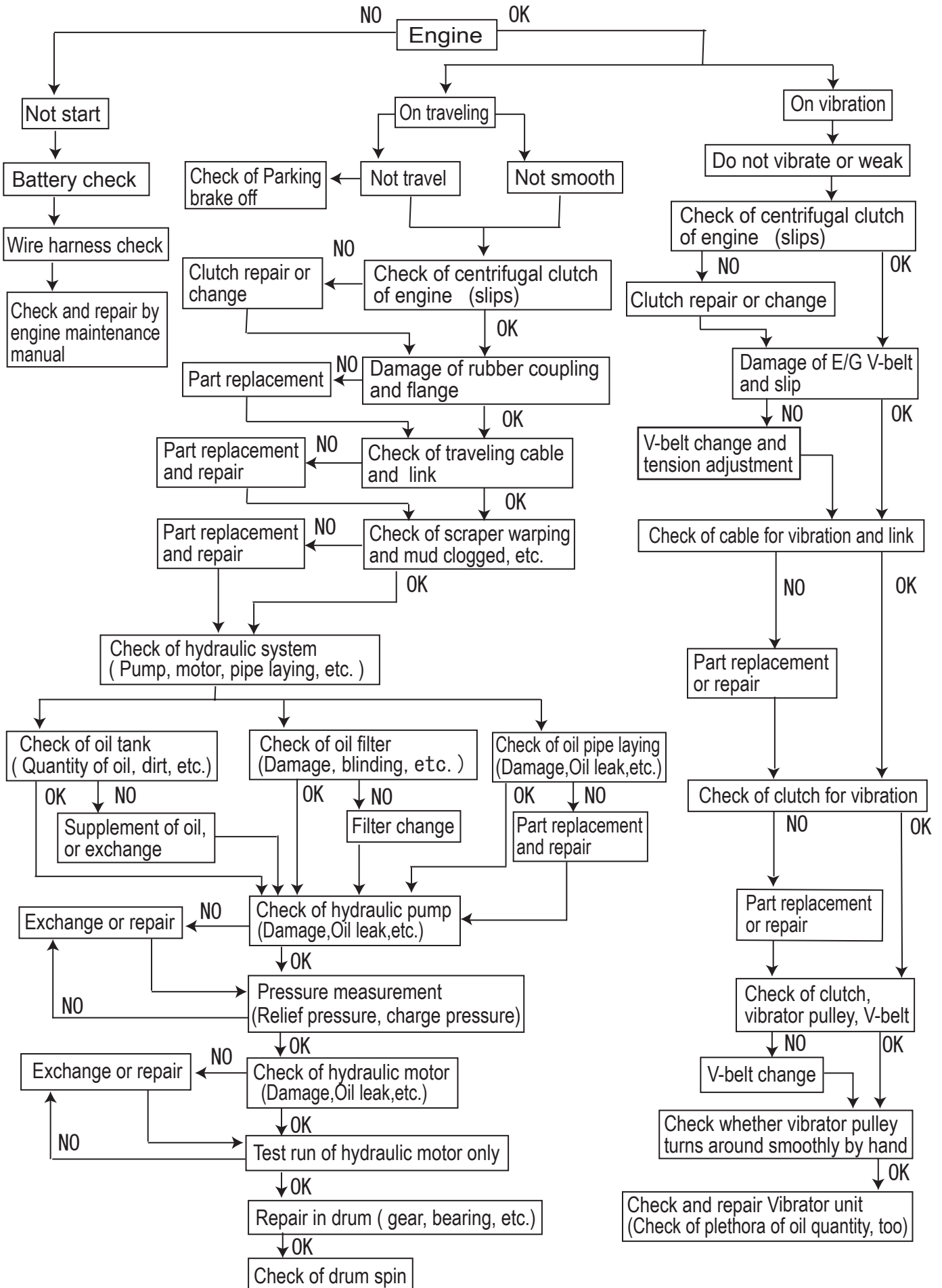
● **Parking brake**
 every 50 hours onto grease fittings



● **Replacement of oil filter**
 First time 25 hours
 Afterward every 500 hours
 (Oil filter use 10 μ filter-paper)



14. TROUBLESHOOTING



Mikasa

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