

# OPERATION / MAINTENANCE AND PARTS MANUAL MSR5KM / MSR6KM VIBRATORY DOUBLE DRUM ROLLER



Read this instruction manual before operating this equipment

August 31, 2009

## SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES

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### OVERVIEW

Before you operate, maintain, or in any other way, use this machine, read and study this manual. Know how to safety use the roller's controls and what you must do for safe maintenance.

**BEFORE YOU OPERATE, MAINTAIN OR IN ANY OTHER WAY, OPERATE THIS MACHINE:**

**READ and STUDY** this manual. **KNOW** how to safely use the unit's controls and what you must do for safe maintenance.

The machine has been built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine and to other material property.

**ALWAYS** wear or use the proper safety items required for your personal protection.

For reasons of security, long hair must be tied back or otherwise secured, garments must be close-fitting and no jeweler - such as rings - may be worn. Injury may result from being caught up in the machinery or from rings catching on moving parts.

If you have **ANY QUESTIONS** about the safe use or maintenance of this unit, **ASK YOUR SUPERVISOR OR CONTACT ANY MEIWA DISTRIBUTOR. NEVER GUESS - ALWAYS CHECK.**

Never make any modifications, additions or conversions which might affect safety without the supplier's approval. This also applies to the installation and adjustment of safety devices and valves as well as to welding work on load-bearing elements.

Observe all fire-warning and fire-fighting procedures. •

### PRE-START INSPECTION

**INSPECT** your machine. Have any malfunctioning, broken or missing parts corrected or replaced before use.

Check the machine at least once per working shift for obvious damage and defects. Report any changes (incl. changes in the machine's working behavior) to the competent organization/person immediately. If necessary, stop the machine immediately and lock it.

Take the necessary precautions to ensure that the machine is used only when in a safe and reliable state.

Operate the machine only if all protective and safety oriented devices, such as removable safety devices, emergency shut-off equipment, sound-proofing elements and exhausts, are in place and fully functional.

## **SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES**

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The electrical equipment of machines is to be inspected and checked at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.

VERIFY that all the instruction and safety labels are in place and readable. These are as important as any other equipment on the roller.

NEVER fill the fuel tank, with the engine running, while near an open flame, or when smoking. ALWAYS wipe up any spilled fuel **immediately**.

CHECK for WARNING tags placed on the machine. DO NOT operate the equipment until repairs have been made and the WARNING tags are removed by authorized personnel.

KNOW the location of the Emergency Shut-Down Control if the machine is so equipped.

### **OPERATING**

In the event of safety-relevant modifications or changes in the behavior of the machine during operation, stop the machine immediately and report the malfunction to the competent authority/person.

Always wear the prescribed ear protectors.

Always make sure that no person or obstruction is in your line of travel. Watch your step to avoid tripping.

USE extreme caution and be observant when working in close quarters or congested areas.

Before beginning work, familiarize yourself with the surroundings and circumstances of the site, such as obstacles in the working and traveling area, the soil bearing capacity and any barriers separating the construction site from public roads.

When traveling on public roads, ways and places always observe the valid traffic regulations and, if necessary, make sure beforehand that the machine is in a condition compatible with these regulations.

Always keep at a distance from the edges of building pits and slopes.

DO NOT run the engine in a closed building for an extended length of time. EXHAUST FUMES CAN KILL.

DO NOT operate the roller on non-compactable material, such as concrete or hardened asphalt.

### **MAINTENANCE**

Observe the adjusting, maintenance and inspection activities and intervals set out in the operating instructions, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.

Ensure that the maintenance area is adequately secured.

Observe the adjusting, maintenance and inspection activities and intervals set out in the operating instructions, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.

After cleaning, examine all fuel, lubricant, and hydraulic fluid lines for leaks, loose connections, chafe marks and damage. Any defects found must be rectified without delay.

Always tighten any screwed connections that have been loosened during maintenance and repair.

Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.

## **SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES**

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Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact. AVOID, whenever possible, servicing, cleaning or examining the unit with the engine running.

NEVER fill the fuel tank, with the engine running, while near an open flame, or when smoking. ALWAYS wipe up any spilled fuel immediately.

ALWAYS disconnect the spark plug before performing any work on the unit.

DO NOT alter the engine governor settings from that indicated in the engine manual.

ALWAYS replace damaged or lost decals. Refer to the Parts Manual for the proper location and part number of all decals.

Carry out welding, flame-cutting and grinding work on the machine only if this has been expressly authorized, as there may be a risk of explosion and fire.

Before carrying out welding, flame-cutting and grinding operations clean the machine and its surroundings from dust and other flammable substances and make sure that the premises are adequately ventilated (risk of explosion).

## SECTION 2 - INTRODUCTION

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EXCELLENT CHOICE! The MEIWA SEISAKUSHO MSR5KM / MSR6KM VIBRATORY DOUBLE DRUM ROLLER you have chosen will give you many hours of maintenance free operation resulting in a faster return of your investment.

Safe operation depends on reliable equipment and the use of proper operating procedures. Performing the checks and services described in this manual will help keep your machine in good condition. These recommended operation procedures will help you to avoid unsafe practices.

Safety notes have been included throughout this manual to help you avoid injury and prevent damage to the equipment. These notes are not intended to cover all eventualities; it is impossible to anticipate and evaluate all possible methods of operation.

Therefore, you are the only person who can guarantee safe operation and maintenance.

It is important that any procedure not specifically recommended in this manual be thoroughly evaluated from the standpoint of safety before it is implemented.

Continuing improvement and advancement of product design may cause changes to your machine which may not be included in this publication. Each publication is reviewed and revised, as required, to update and include these changes in later editions.


















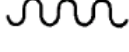










MEIWA SEISAKUSHO reserves the right to modify or make changes within a specific model group without notice and without incurring any liability to retrofit units previously shipped from the factory. Contact your MEIWA SEISAKUSHO Distributor for non-routine maintenance information that is not covered in this publication.

## SECTION 3 - SYMBOL IDENTIFICATION AND METRIC CONVERSION

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### INTERNATIONAL MACHINE SYMBOLS

The following explains the meaning of international symbols that may appear on your machine



















	OIL PRESSURE		BRAKE		HOURS
	WATER TEMPERATURE		HORN		NEUTRAL
	ON / OFF		CAUTION		LOW ENGINE RPM.
	LIGHTS		FUEL		BRAKE-PARK
	WATER		SLOW		VIBRATION
	BATTERY		FAST		AMPLITUDE
	AMMETER OR VOLTMETER		TRANSMISSION		FREQUENCY
	AIR PRESSURE		GREASE		CAUTION-PRESSURIZED
	LOW AIR PRESSURE		OIL		
	ENGINE RPM		HYDRAULIC OIL		

**SECTION 3 - SYMBOL IDENTIFICATION AND METRIC CONVERSION  
INTERNATIONAL HIGHWAY SYMBOLS**

The following symbols may also appear in a yellow square instead of a red triangle.

	Road bends		Uneven road
	Dangerous bend		Ridge
	Double bend		Dip
	Dangerous descent		Slippery road
	Steep ascent		Loose gravel
	Carriageway narrows		No entry for power driven vehicles
	Carriageway narrows		No entry for vehicles exceeding length
	“end of priority” sign		No entry for vehicles exceeding length
	Oncoming traffic has priority		Falling rocks
	Priority over oncoming traffic		Pedestrian crossing
	Swing bridge		Road work
	Road leads onto quay or river bank		Light signals

**SECTION 3 - SYMBOL IDENTIFICATION AND METRIC CONVERSION**

	Two-way traffic		“give way” sign
	Other dangers		Stop sign (new)
	Level crossing		Stop sign (old)
	Level crossing		“priority road” sign
	No entry		No entry for vehicles exceeding weight
	Closed to all vehicles in both directions		No entry for vehicles axle weight exceeding
	Intersection, user must give way		No u-turn
	Intersection, user must give way		No turn direction shown
	Intersection, user must give way		No entry for power driven vehicles



**SECTION 3 - SYMBOL IDENTIFICATION AND METRIC CONVERSION**

<b>TO CONVERT</b>	<b>OMREGNET FRA</b>	<b>INTO TIL</b>	<b>MULTIPLY BY MULTIPLICERES MED</b>
Bar		Pound/sq.in	14.50
Bar		Kilopascals	100.
Centigrade		Fahrenheit	$(C^{\circ} \times 9/5) + 32$
Centimeters		Inches	0.3937
Centimeters		Millimeters	10.0
Circumference		Radians	6.283
Cubic centimeters		cu.inches	0.06102
Degrees (angle)		Radians	0.01745
Degrees/sec.		Revolutions/min	0.1667
Feet		Meters	0.3048
Feet/min		Meters/min.	0.3048
Foot-pounds		Kg-meters	0.1383
Gallons		Liters	3.785
Hertz		Vibrations/min.	60.
Horsepower		Kilowatts	0.7457
Inches		Centimeters	2.540
Inches		Millimeters	25.40
Kilograms		Pounds	.250
Kilogram meters		-Pounds	7.233
Kilopascal		Pounds/sq.in	0.1450
Kilopascal		Bars	0.01
Kilowatts		Horsepower	1.341
Liters		Gallons (U.S. liq)	0.2642
Liters		Pints (U.S. liq)	2.113
Liters		Quarts (U.S. liq)	1.057
Meters		Feet	3.281
Meters		Inches	39.37
Meters/min		Feet/sec	0.05468
Miles/hr		kms/hr	1.609
Millimeters		Inches	0.03937
Newtons		Pounds	4.448
Newton-meter		Pound-feet	0.737
Pounds		Kilograms	0.4536
Pounds		Newtons	0.225
Pound feet		Newton-meter	1.356
Pounds/ft.		kgs/meter	1.488
Pounds/sq in		Bars	0.06895
Pounds/sq in		Kilopascals	6.895
Quarts (liq)		Liters	0.9463
Radians		Degrees	57.30
Radians/sec		Revolutions/min	9.549
Revolutions/min		Degrees/sec	6.0
Revolutions/min		Radians/sec	0.1047
Temperature (°C) + 17.78		Temperature (°F)	1.8
Temperature (°F) - 32		Temperature (°C)	5/9
Tons (short)		Tons (metric)	0.9078
Vibrations/min		Hertz	0.0167

## SECTION 4 - OTHER EQUIPMENT

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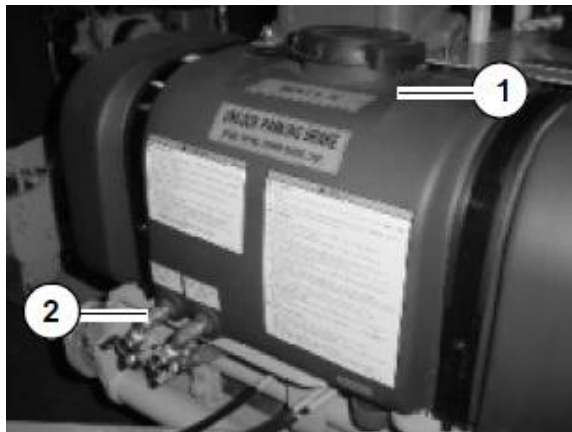
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OPERATING HANDLE	2

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### WATER SPRINKLER UNIT

During compacting operation, compacting pressure of roller will be increased if water tank (1, Figure 3-1) is filled with water. By operating the sprinkler cock (2, Figure 4-1) water can be distributed evenly for paving work.

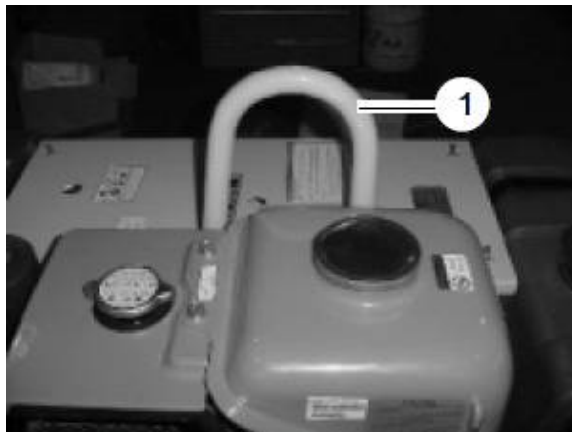
Figure 4-1



### SINGLE POINT HOISTING

The compactor can be moved when not in operation using the single point-hoisting device (1, Figure 4-2).

Figure 4-2



## SECTION 4 - OTHER EQUIPMENT

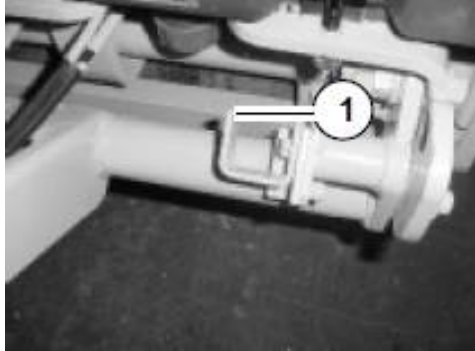
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### OPERATING HANDLE

Operating handle can be easily shifted from horizontal position to vertical position. Accordingly, roller can be used in close quarters, close edge work, around obstacles even in reverse operation. It also saves floor space when storing. To stand up the handle, pull fixed pin (1, Figure 4-3) and lift handle.

**Figure 4-3**



## SECTION 5 - OPERATING INSTRUCTIONS

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### **WARNING**

**Improper maintenance can be hazardous.**

**Read and understand SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES before you perform any maintenance, service or repairs.**

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### **SAFETY CHECKS - PRESTART**

READ this Instruction Manual and the Engine Manual.

IF YOU ARE IN DOUBT OF THE OPERATION OF THIS UNIT AFTER READING THESE PROCEDURES - SEE YOUR SUPERVISOR. READ ALL OF THE INSTRUCTIONS PRIOR TO STARTING THE MACHINE.

Before starting each day, in addition to the 10 hour daily routine maintenance, check or inspect the following items to ensure trouble free performance.

1. Check fluid lines, hoses, fittings, filler openings, drain plugs, pressure cap, muffler, safety shrouds, retighten bolts and nuts, and the area underneath the unit for signs of leakage or damage. Fix any leaks and correct any damage before operating.
2. Inspect the entire unit for damaged or missing parts and repair or replace them as needed.
3. Check the fuel level. If necessary, fill the fuel tank with the proper fuel.

### **WARNING**

Fuel is flammable. May cause injury and property damage.

Shut down the engine, extinguish all open flames and do not smoke while filling the fuel tank.

Always wipe up any spilled fuel.

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4. DO NOT operate faulty equipment.
5. Be aware of people and obstructions within your work area.
6. Check Engine Oil level.

## SECTION 5 - OPERATING INSTRUCTIONS

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### PRIOR TO OPERATION

#### OPERATING LEVERS

**⚠ CAUTION**

When handling forward/reverse lever, avoid sudden position change from forward position to reverse position or from reverse to forward. To change lever position, the lever must be moved to the neutral position first. Sudden lever change may damage the power Transmission Mechanism.

#### VIBRATION ON HARD SURFACE

**⚠ CAUTION**

When roller travels on hard surfaces (like concrete) do not engage vibrating operation. This will cause the roller to bounce excessively. The vibration may damage the roller's body.

#### PARKING ON SLOPE

Avoid parking on a slope as much as possible.

However, if parking on a slope is unavoidable, shift the parking brake lever to "lock" position.

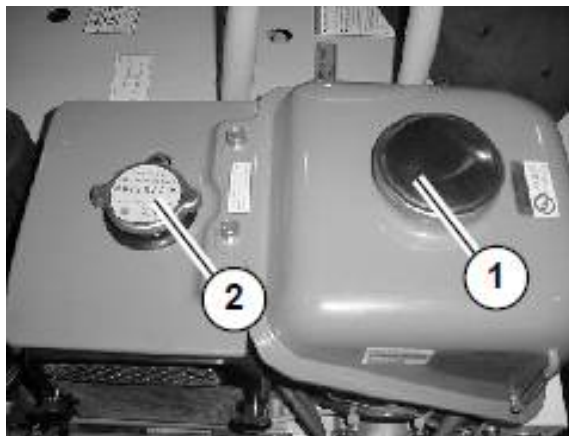
Chock the drums.

Be sure to release the parking brake before forward/reverse operation.

#### FILLING FUEL TANK

Remove the fuel tank cap (1, Figure 5-1) and fill with light diesel fuel per engine manual.

**Figure 5-1**



**⚠ CAUTION**

Do not remove the radiator cap while engine is running or when hot.

#### COOLANT

To fill the radiator with coolant remove radiator cap (2, Figure 5-1) and fill radiator. Secure the pressure cap after filling.

## SECTION 5 - OPERATING INSTRUCTIONS

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Do not pour muddy water or seawater into radiator.

In cold weather tap water in the radiator may freeze, breaking it.

To prevent this, add anti-freeze to the coolant.

Follow coolant manufacturer's recommendation for mixing ratio.

When not using an anti-freeze, and there is a chance of freezing, be sure to drain radiator of coolant after each use.

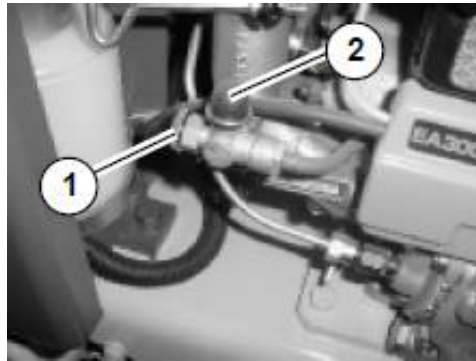
Capacity of coolant: 1.2 liters (1.3 qts.).

### JET STARTER

If starting the engine is difficult because of the cold, use the jet starter.

- 1) Turn the jet starter cock (1, Figure 5-2) counterclockwise to open.
- 2) Push the starter knob (2, Figure 5-2) 4 or 5 times.
- 3) Close the cock completely.
- 4) Pull the decompression lever; turn on the starter switch, then set the lever free after the engine rotates.

Figure 5-2

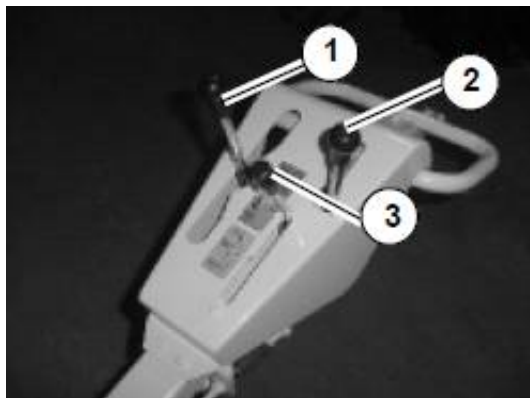


## STARTING & OPERATION

### STARTING ENGINE

- 1) Position the forward/reverse lever (1, Figure 5-3) to "neutral" position.
- 2) Position the vibration lever (2, Figure 5-3) to "off" position.
- 3) Position the throttle lever (3, Figure 5-3) to 1/2 position.
- 4) Turn the starter-key clockwise to the "pre-heat" position.
- 5) Wait about 5 seconds.
- 6) Turn the starter-key clockwise to the "start" position.
- 7) Release the starter-key as soon as the engine starts running.
- 8) Shift the throttle lever (3, Figure 5-5) to the "low" position immediately after the engine starts.
- 9) Warm up the engine for about 5 minutes.

Figure 5-3



## SECTION 5 - OPERATING INSTRUCTIONS

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### OPERATION

1. Make sure the parking brake lever is positioned in “unlock”
2. Shift the throttle lever to “high” position.
3. Roller can now be moved forward, reverse, and stopped by the forward/reverse lever.
4. To vibrate the roller, shift the vibration lever to “on” position.

#### Note:

When first starting the engine is still cold and lubricating oil is not circulated sufficiently, allow the engine to operate without load for about 5 minutes before running with full power.

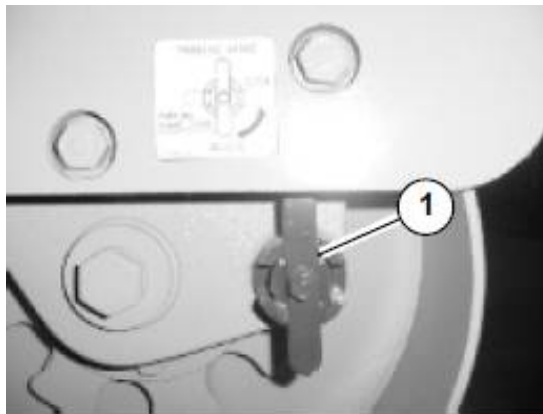
### STOPPING ENGINE AND ROLLER

1. Shift the forward/reverse lever to “neutral” position.
2. Shift the vibration lever to “off” position.
3. Shift the lever to “stop” position, and the engine stops.

### PARKING BRAKE

1. Traveling: Shift the parking lever (1, Figure 5-4) to the “unlock” position, Figure 5-4 shows the unlocked position.
3. Parking: Shift the parking lever (1, Figure 5-4) to the “lock” position.

Figure 5-4



**⚠ CAUTION**

Avoid parking on a slope as much as possible.

However, if parking on a slope is unavoidable, shift the parking brake lever to “lock” position.  
Chock the drums.

## SECTION 6 - FUEL & LUBRICATION SPECIFICATIONS

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<b>FLUID CAPACITIES</b> _____	<b>1</b>

### GENERAL INFORMATION

Lubrication is an essential part of preventive maintenance, affecting to a great extent the useful life of the unit. Different lubricants are needed and some components in the unit require more frequent lubrication than others.

Specific recommendations of brand and grade of lubricants are not made here due to regional availability, operating conditions, and the continual development of improved products. Where questions arise, refer to the requirements and specifications in the engine manufacturer's manual.

All oil levels are to be checked with the machine parked on a level surface, and while the oil is cold, unless otherwise specified.

FLUID CAPACITIES	
FLUID/OIL	APPROXIMATE CAPACITY
ENGINE OIL/DIESEL GR. CB _____	**
RADIATOR _____	<b>1.2 LITERS</b>
ECCENTRIC OIL/VISCOSITY 32 _____	<b>.75 LITERS (MSR5)</b>
	<b>.90 LITERS (MSR6)</b>
ENGINE FUEL _____	**

\*\* See Engine Manual

### REGULAR MAINTENANCE

Please read the "Engine Instruction Manual" carefully for Engine Maintenance.

The best guarantee for long working life and constant readiness of the roller is correct and regular maintenance.



## SECTION 7 - INITIAL BREAK-IN MAINTENANCE

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### **WARNING**

**Improper maintenance can be hazardous.**

**Read and understand SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES before you perform any maintenance, service or repairs.**

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Any new equipment requires an initial modification of the maintenance schedule to properly break-in the various systems and component units. Perform this one time initial break-in maintenance at the times specified below IN ADDITION TO the 10 hour, 50 hour and 100 hour maintenance tasks, which are described on the following pages. After the initial phase, the regular intervals should be followed.

### **WARNING**

**Hot oil and/or components can burn.**

**Oil must be at normal operating temperature when draining.**

**Avoid contact with hot oil or components.**

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#### **ENGINE OIL**

Drain the engine oil after the first 20 hours of operation. Fill with the correct amount of the recommended oil. Check the oil level with the oil filler cap/dip stick. See Section 12 to change oil.

## SECTION 7 - INITIAL BREAK-IN MAINTENANCE

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### MAIN BODY OIL

Drain the main body oil after the first 50 hours of operation. Remove the drain plug, and the fill plug. Drain out the oil and fill with the correct amount of the recommended oil. Check the oil level before each use of the machine.

### TABLE OF INSPECTION INTERVALS

1. Inspection of engine  
Please refer to the inspection manual for Kubota engine.
2. Inspection of roller.

**A:** Check-up    **B:** Replenishing    **C:** Replacing

No	Inspection Item	Daily	Every 24 hrs	Every 100 hrs	Every 500 hrs
1	Looseness of bolts and nuts	A			
2	Damage, oil leakage	A			
3	V-belt			A,C	
4	Eccentric Shaft Case Oil			A,C	
5	Hydraulic Oil Tank	A(Reserve)		A,C	
	Oil Filter		C (Initial)		C

## SECTION 8 - 10 HOUR OR DAILY ROUTINE MAINTENANCE

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V-BLET _____	2
AIR CLEANER _____	2

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### **WARNING**

Improper maintenance can be hazardous.

Read and understand **SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES** before you perform any maintenance, service or repairs.

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It is recommended that the following steps be performed at the beginning and end of each 8 to 10 hour shift or daily, whichever comes first.

#### **DAILY CHECK**

Make the following daily checks without fail before starting.

1. Check engine oil level and refill as necessary.
2. Check air-cleaner.
3. Check engine coolant, refill if necessary.
4. Check fuel.
5. Check hydraulic oil level and refill if necessary.
6. Check for loose bolts and nuts.
7. Check for loose parts, damage and oil leaks.
8. Check abnormal exhaust gas, noise and vibration.

#### **ENGINE OIL**

Check the engine's oil level at the start of each day and maintain it to the full mark on the dipstick. Insert the dipstick and check the full mark on the dipstick. Do not screw the gauge in first. See Section 12 to change engine oil.

## SECTION 8 - 10 HOUR OR DAILY ROUTINE MAINTENANCE

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### FUEL



**Fuel is flammable. May cause severe injury or death.**

**Shut down the engine, extinguish all open flames and do not smoke while filling the tank.**

**Always wipe up any spilled fuel.**

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Clean around the fuel tank cap before removing and fill the tank with the recommended fuel per the specifications in SECTION 6 - FUEL AND LUBRICATION SPECIFICATIONS of this manual.

### FASTENING HARDWARE

Check all fastening hardware to ensure it is all adequately tightened and that none is missing or broken.

### CHECKING V-BELT

Changing: Check V-belts to see if they are worn or damaged, replace them as needed.

### CLEANING AIR CLEANER AND REPLACING ELEMENT

Under normal conditions, clean the element every 100 hours. However if operating in a particularly dusty place clean element every 10 hours, see Section 10.

## SECTION 9 - 50 HOUR OR WEEKLY ROUTINE MAINTENANCE

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### Note

\* See Engine Manual for Engine 50 Hour Maintenance Requirements \*

## SECTION 10 - 100 HOUR OR MONTHLY ROUTINE MAINTENANCE

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AIR CLEANER \_\_\_\_\_

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1

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### CLEANING AIR CLEANER AND REPLACING ELEMENT

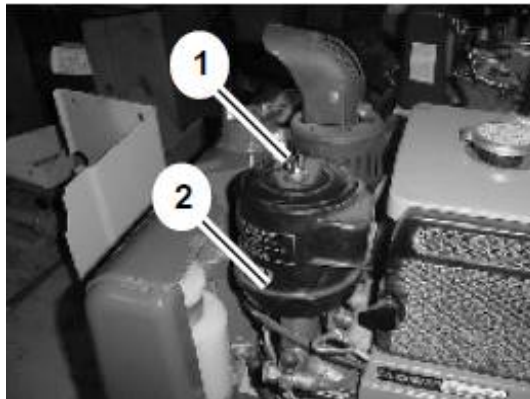
Under normal conditions, clean the element every 100 hours. However if operating in a particularly dusty place clean element every 10 hours.

1. Remove dirt from dust cup and remove wing nut (1, Figure 10-1 form air cleaner (2, Figure 10-1).
  2. Clean element by blowing air from inside or by lightly tapping the element.
- If dust contains carbon, contact your Kubota dealer for the recommended cleaner.

### PRECAUTIONS

1. Replace elements every year or after cleaning six times.
2. If the element is damaged, replace. Otherwise, the engine's service life may be shortened.

Figure 10-1



**SECTION 11 - 300 HOUR OR QUARTERLY ROUTINE MAINTENANCE**

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**NOTE:**

**\* No 300 Hour or Quarterly Routine Maintenance Required \***

## SECTION 12 - 500 HOUR OR SEMI-ANNUAL ROUTINE MAINTENANCE

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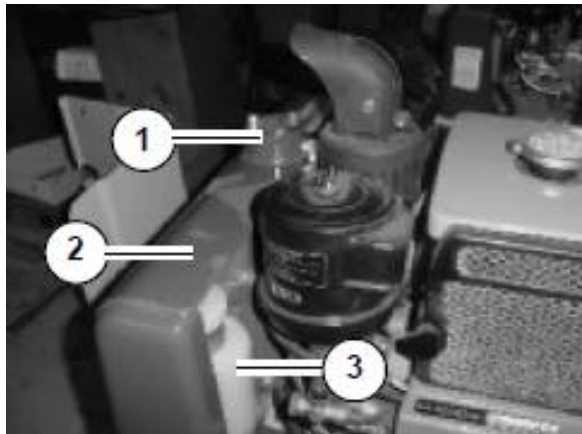
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### CHANGING HYDRAULIC OIL

Hydraulic oil should be changed every year or every 500 working hours. To add oil remove oil tank cap (1, Figure 12-1) from oil tank (2, Figure 12-1). This machine is also equipment with a hydraulic oil reserve tank (3, Figure 12-3).

Figure 12-1



### CHECKING AND CHANGING OIL IN ECCENTRIC SHAFT CASE

Remove oil level/supply plug (1, Figure 12-2). Check whether oil is full up to the oil supply port. Replenish the hydraulic oil (viscosity 32), if necessary.

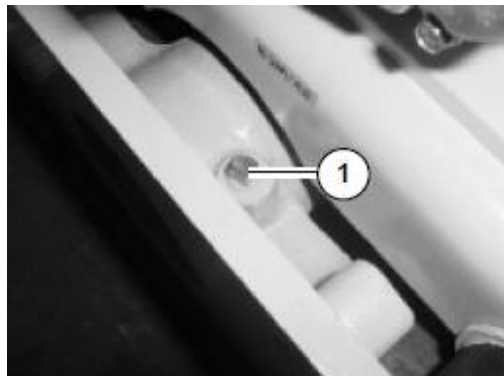
Capacity:

DX-500E: 0.75 liters (0.79 Qts)

DX-600E: 0.9 liters (.95 Qts)

Hydraulic oil should be changed every year or every 500 working hours.

Figure 12-2





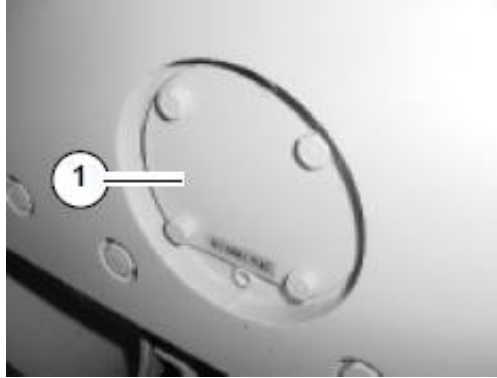
## SECTION 12- 500 HOUR OR SEMI-ANNUAL ROUTINE MAINTENANCE

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To drain hydraulic oil from system and add new oil, remove drain plug (1, Figure 12-3) until oil has completely drained. Secure drain plug and add new hydraulic oil using oil supply port (1, Figure 12-2).

**Figure 12-3**



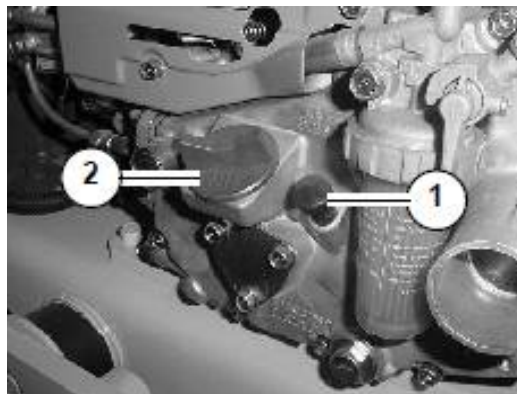
### ENGINE OIL

Check the oil level with oil gauge (1, Figure 12-4). Add oil if necessary using the engine supply plug (2, Figure 12-4). Care must be taken to keep correct oil level at all times.

To insure long life and durability of engine, use only a high quality oil (more than CB grade). Do not mix oil grades. Refer to Kubota Engine Manual.

Using engine oil with a high degree of viscosity at low temperatures may make the engine difficult to start.

**Figure 12-4**



**SECTION 13 - 1000 HOUR OR ANNUAL ROUTINE MAINTENANCE**

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**WATER TANK** \_\_\_\_\_

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**NOTE**

**\* No 1000 Hour or Annual Routine Maintenance is required. \***

## SECTION 14 - ROUTINE ADJUSTMENTS

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### NOTE

\*See Engine Manual for Engine Routine Adjustments\*

**SECTION 15 - MISCELLANEOUS AND OPTIONAL EQUIPMENT**

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**NOTE**

**\* No Miscellaneous and Optional Equipment \***

## SECTION 16 - SCHEMATICS

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### NOTE

\* No Schematics are necessary for this unit. \*

