Open front screen

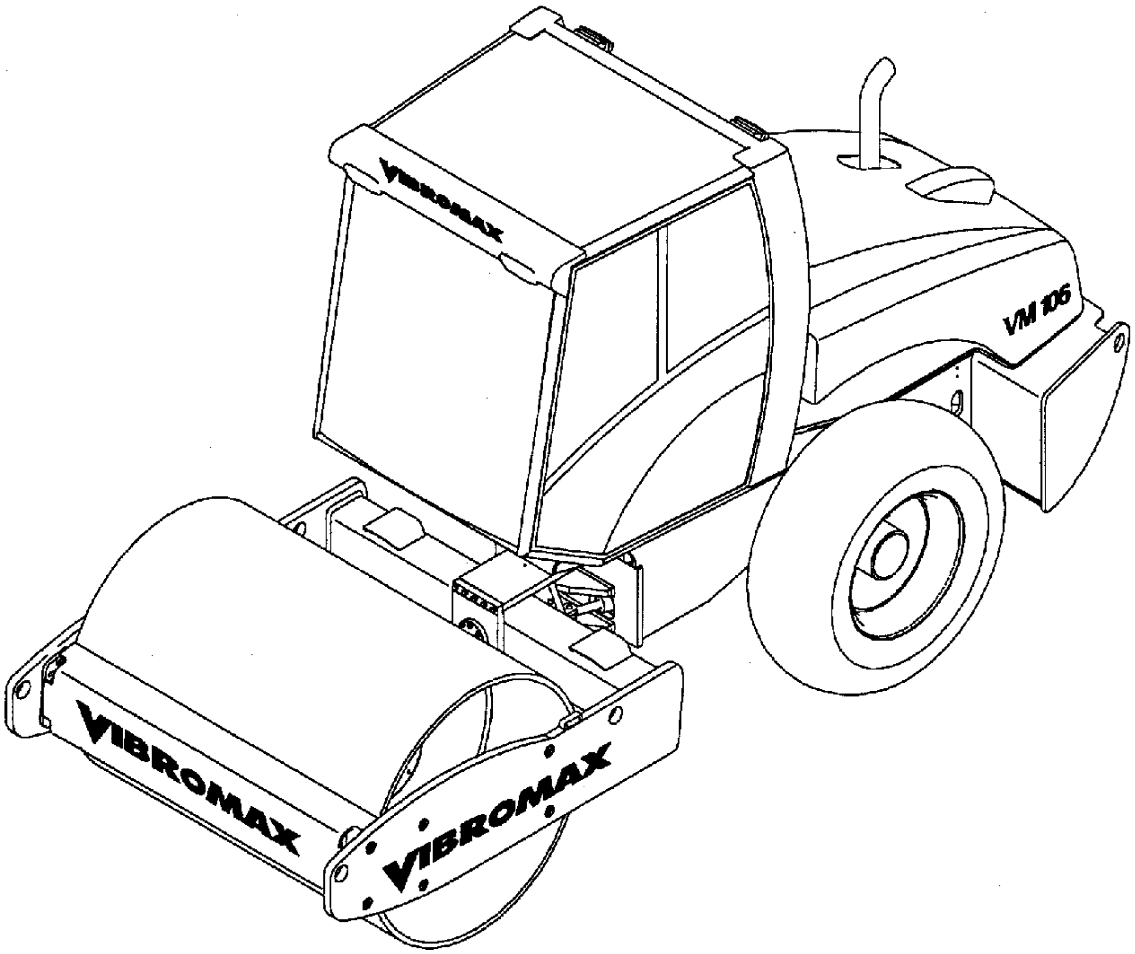
VIBROMAX

SINGLE DRUM ROLLER

SERVICE MANUAL SM96106

July 2004

Model VM 106



CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

SECTION ONE

GENERAL INFORMATION

SECTION TWO

ENGINE

SECTION THREE

ELECTRICAL

SECTION FOUR

HYDRAULIC

SECTION FIVE

POWER TRAIN

SECTION SIX

PARKING BRAKE SYSTEM

SECTION SEVEN

VIBRATION SYSTEM

SECTION EIGHT

STEERING SYSTEM

SECTION NINE

CHASSIS

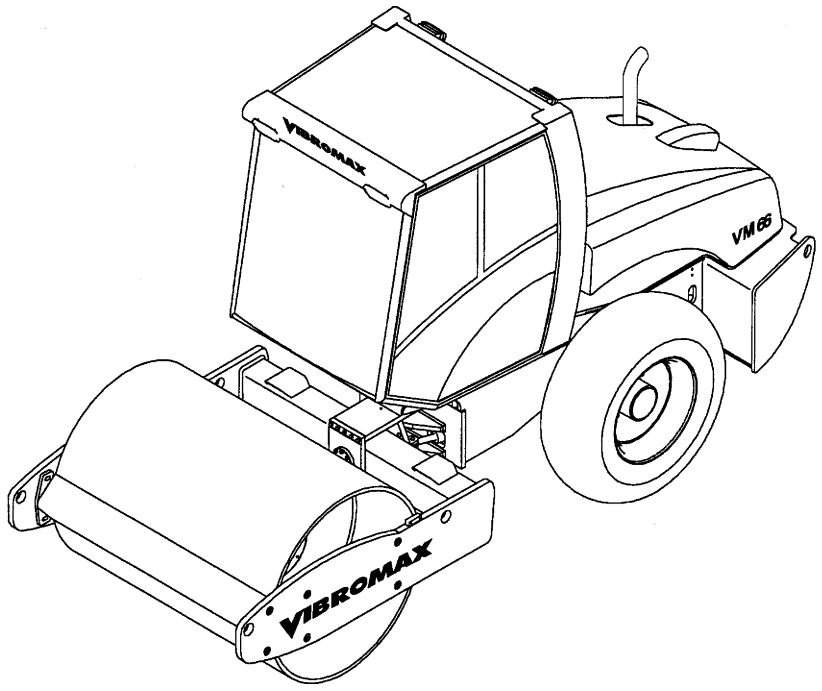
SECTION TEN

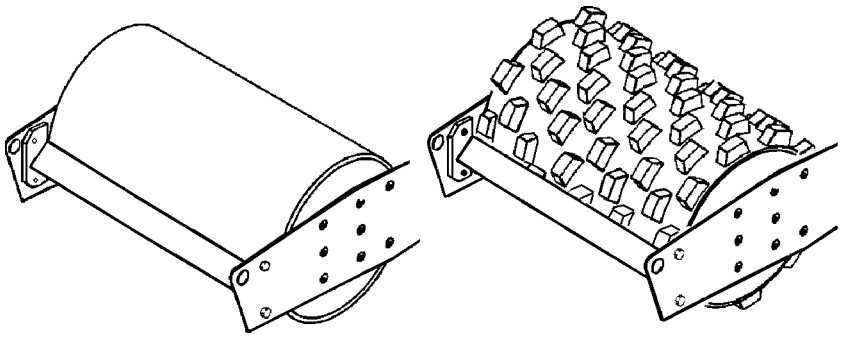
ATTACHMENTS

SECTION ONE

GENERAL INFORMATION

MACHINE DESCRIPTION





SMOOTH DRUM PADFOOT DRUM

This book introduces the new Vibromax 6 series single drum rollers. Included within the pages of the book are materials covering the Model VM106.

The new roller uses the Cummins 3.9 liter 4 cylinder engine. The engine is turbocharged and tuned to meet the latest EPA emissions standards.

A Mannesman Rexroth variable displacement, axial piston hydrostatic pump, used for machine propulsion, is mounted to the flywheel end of the engine. It provides oil to a Rexroth 2 speed drum drive motor and a 2 speed axle drive motor in a parallel path. The Rexroth drum motor is mounted on the left side of the drum, drives through a L&S planetary gearbox and is isolated from the drum by rubber buffers. This arrangement is used in the heavy roller models with a great deal of success. The axle drive motor is attached directly to the intermediate gearbox incorporated into the rear axle.

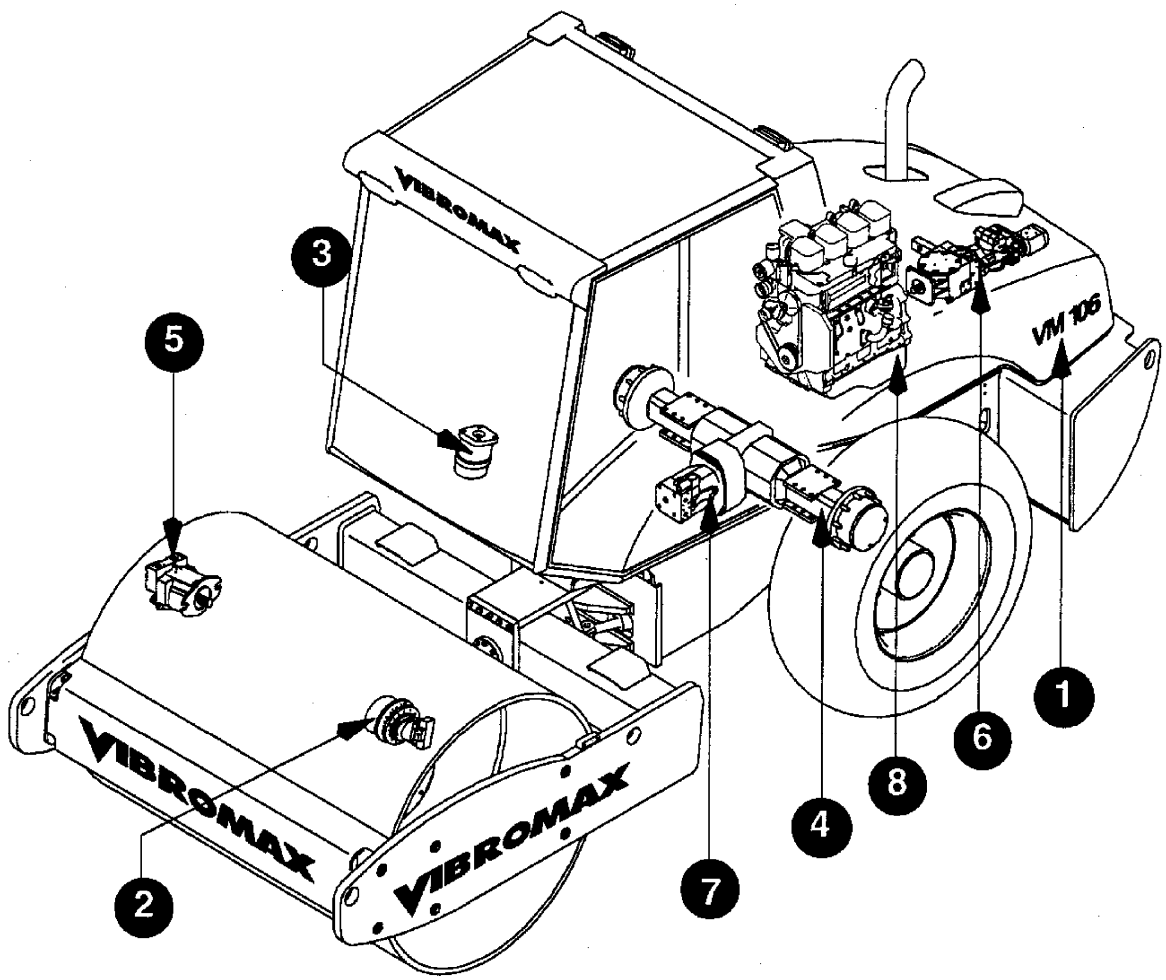
The vibration system on the VM106 uses a Rexroth hydrostatic pump mounted directly behind the propulsion pump. It is similar in design to the propulsion pump. The vibratory pump supplies oil to a Rexroth hydrostatic motor mounted at the right side of the drum. This operates at frequencies of 1860 or 2160 vibrations per minute on both the smooth drum and pad foot versions.

A steering pump, mounted to the rear of the vibratory pump, provides the oil needed for steering. The steering pump also acts as the charge pump in the propulsion and vibration systems. The steering pump draws oil from the reservoir, passes it through the steering control valve, through the inline hydraulic filter, and into the charge circuit.

This machine comes standard with parking brakes at both the front drum and the rear axle. A spring applied-hydraulically released multi disc brake is part of the drum drive motor gearbox. The axle uses a spring applied hydraulically released multiple disc brake at each axle shaft.

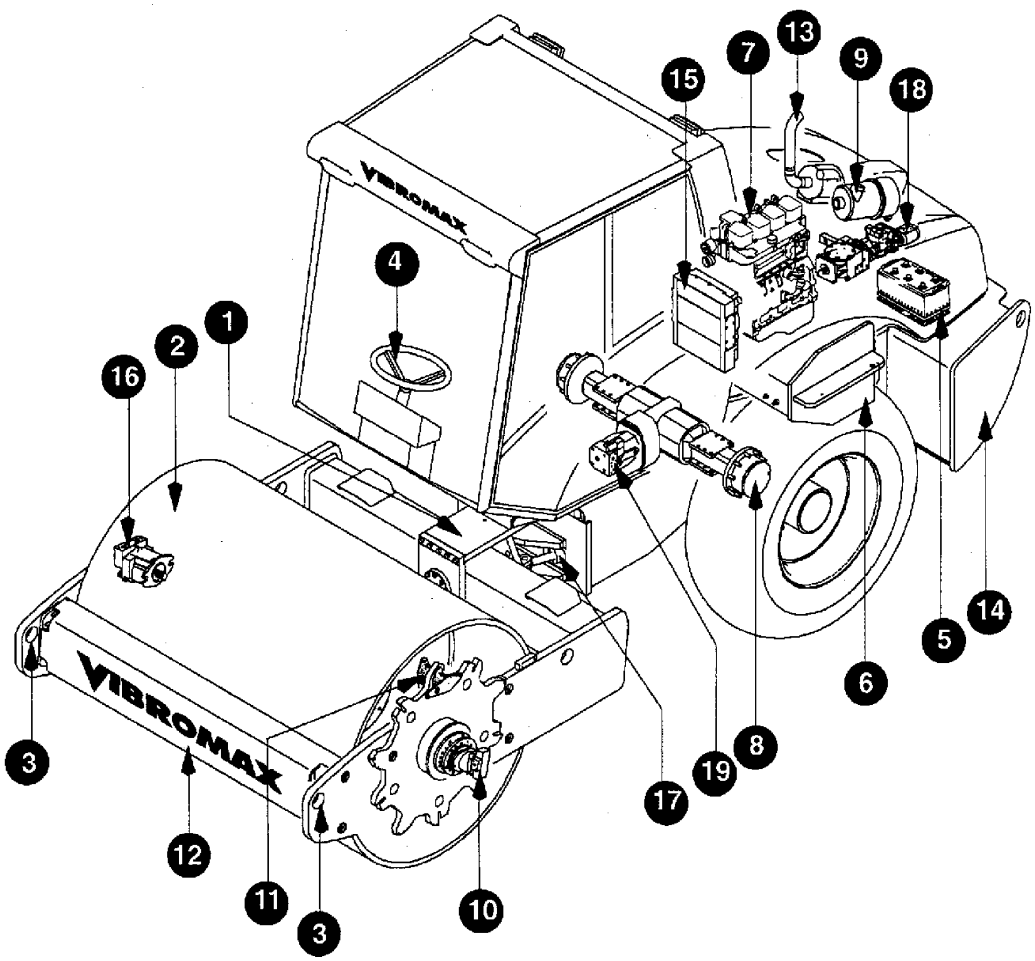
Pressure testing has been made easier by placing all the test ports at a centrally located test station under the engine hood.

The electrical system consists of a 12 volt battery, starter, alternator system, optional lighting and standard instrumentation.



SERIAL NUMBERS

1	Model / Serial Number	
2	Front Drum Drive Motor S/N	
3	Steering Unit S/N	
4	Axle S/N	
5	Vibratory Motor S/N	
6	Hydraulic Pumps S/N	
7	Axle Drive Motor S/N	
8	Engine S/N	



IDENTIFYING MACHINE COMPONENTS

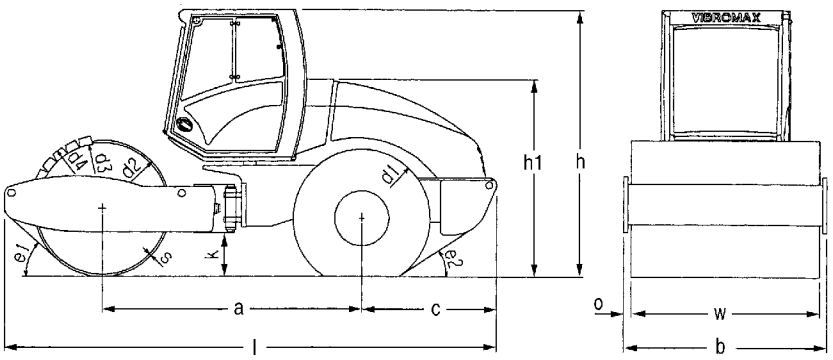
1	Articulation joint	11	Isolation buffer
2	Smooth drum	12	Scraper
3	Lifting and towing eyes	13	Engine exhaust
4	Operator's platform	14	Fuel tank
5	Battery	15	Cooling system
6	Hydraulic tank	16	Vibration motor
7	Engine	17	Steering cylinder
8	Axle	18	Hydraulic pumps
9	Air filter	19	Axle drive motor
10	Drum drive motor		

FLUID SPECIFICATIONS

MACHINE PART	CAPACITY USA (metric)	SPECIFICATIONS
Fuel tank	79.3 gal (300 l)	see diesel fuel
Engine crankcase	11.5 qts(11.0 l)	engine oil API classification API-CI-4 multigrade engine oil (see oil chart)
Hydraulic system Reservoir only	21.1 gal (80 l) 15.9 gal (60 l)	cold weather HLP 46 DIN 51524/2 hot weather HLP 68 DIN 51524/2 Mobil DTE 25,26 Shell Tellus OL 46,68 Amoco Rykon HD 46,68 Texaco Rando HD 46,68
Input Gearbox Differential gear Planetary (each)	1.8 qts (1.75 l) 10.0 qts (9.5 l) 2.1 qts (2.0 l)	SAE 90 API GL-5 gear lubricant Alternate SAE 85/140 API GL-5 gear lubricant
Drum gearbox	1.4 qts (1.3 l)	CLP 220 LS 2 DIN 51517/3 Mobilgear 630 Mobilgear SHC 220 Texaco Syngear 220
Vibration system	3.7 qts (3.5 l)	CLP 150 DIN 51517/3 Mobil Gear 629 Shell Omala 150 Texaco Meropa 150
Battery	as required	Distilled water
Grease	as required	KP3K DIN 51502 Mobil Oil - Mobilux 3 Shell Oil - Alvania 3 Texaco Oil - Starplex 3
Engine coolant	14.8 qts (14 l)	50% ethylene glycol and 50% water -34 degrees F (-37 degrees C)
Tire ballast	see tire ballast	Calcium Chloride (77%$CaCl^2$)

MACHINE SPECIFICATIONS

MODEL VM106



	in.	mm
a	112.0	2846
b	88.6	2250
c	60.0	1523
d1	59.8	1520
d2	59.1	1500
d3	55.1	1400
d4	63	1600
h	115.6	2935
h1	86.0	2185
k	17.6	447
l	214.3	5444
o	3	75
s	1	25
w	82.7	2100
e1	41 degrees	
e2	32 degrees	

ENGINE Make/Model/Type/Displacement - cu. in. (cc) HP, SAE net (kW) @2200 rpm Air Cleaner / Fuel filter Fuel capacity - gal (ltr)	Cummins 3.9 125C, 4 cylinder turbo diesel (water cooled), 239 cu.in. (3920cc) with charge air cooler 125 (93) Dual replaceable elements, Spin-on cartridge 79.3 (300)			
	VM106D		VM106PD	
Operating weight max. -lb (kg)	24912 (11300)		25574 (11600)	
Weight, front-lb (kg)	13228 (6000)		13889 (6300)	
Weight, rear axle - lb (kg)	11684 (5300)		11684 (5300)	
Static applied linear drum load lb/in (kg/cm)	160 (28.6)		----------	
Articulation/oscillation-degrees	35/15		35/15	
Turning radius-inside-ft. (m)	11.16 (3.4)		11.16 (3.4)	
Drum shell thickness-in. (mm)	1.0 (25)		1.0 (25)	
Number of pad feet/height of foot - in. (mm)			132/ 3.9 (100)	
Contact area of foot-sq. in. (cm)			64 sq.in.(413 sq. cm)	
Tire size	23.1 - 26 8PR diamond tread		23.1 - 26 8PR tractor tread	
Travel speed - 1st range mph (km/hr)	0 - 2.8 (0 - 4.5)		0 - 2.8 (0 - 4.5)	
- 2nd range mph (km/hr)	0 - 6.5 (0 - 10.5)		0 - 6.5 (0 - 10.5)	
Theoretical gradeability up to - %	60		65	
Brakes - front drum	disc		disc	
- rear axle	disc - input shaft		disc - input shaft	
	1st Stage	2nd Stage	1st Stage	2nd Stage
Max compaction depth up to - in. (cm)	35 (90)	----------	28 (70)	----------
Frequency - vpm (Hz)	1860 (31)	2160 (36)	1860 (31)	2160 (36)
Amplitude - in. (mm)	.077 (1.95)	.035 (0.9)	.077 (1.95)	.035 (0.9)
Centrifugal force - lbf (kN)	58675 (261)	36644 (163)	63396 (282)	39566 (176)
Centrifugal force/drum width - lb/in. (N/cm)	710 (1243)	443 (776)	767 (1343)	479 (838)

STANDARD TORQUE DATA

Where no special torque data is specified, the following torque figures should be applied. Threads should be lubricated with engine oil or grease.

STANDARD TORQUE SPECIFICATIONS +/- 10%

	GRADE 8.8		GRADE 10.9		GRADE 12.9	
SIZE	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
5mm	4	5.5	5.5	7.5	6.6	9
6mm	6.6	9	9.2	12.5	11	15
8mm	16.5	22.5	23	31.5	26.5	36
10mm	32	44	45	62	55	75
12mm	57	77.5	81	110	95	130
14mm	88	120	125	170	155	210
16mm	140	190	195	265	236	320
18mm	192	260	269	365	320	435
20mm	273	370	383	520	457	620
22mm	369	500	516	700	619	840
24mm	471	640	665	900	796	1080
27mm	702	950	996	1350	1195	1620
30mm	955	1300	1328	1800	1593	2160

NUTS FOR TUBES AND HOSES

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
16MM X 1.5	20	14.5
18MM X 1.5	35	26
20MMX1.45	45	33.2
24MM X 1.5	60	44

FITTINGS, CONNECTIONS AND PLUGS

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
10MM X 1	20	14.5
12MM X 1.5	35	26
14MM X 1.5	45	33.2

FITTINGS, CONNECTIONS AND PLUGS

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
16MM X 1.5	60	44
18MM X 1.5	70	51
22MM X 1.5	100	73
27MM X 2	200	147
33MM X 2	280	207
42MM X 2	380	281

FLANGES

DIAMETER & PITCH	NEWTONS/METER	POUNDS/FOOT
8MM X 1.5	28	21
10MM X 1.5	55	41
12MM X 1.75	90	67
14MM X 2	145	107
16MM X 2	230	170

DIESEL FUEL SPECIFICATION

If fuel is stored for a long time, foreign particles or water can collect in the fuel storage tank. Many engine problems are caused by contaminated fuel. Store fuel outside and keep the fuel as cool as possible. Drain water from the fuel storage tank at regular intervals.

NOTE: Paraffin crystals will start to form in fuel when the fuel temperature falls below the fuel's cloud point. These paraffin crystals will clog the fuel filter and cause the engine to stop or lose power. At ambient temperatures above 32°F (0°C) use #2 diesel fuel. At temperature below 32°F (0°C) use #1 diesel fuel blend.

Different brands of fuel can exhibit different properties. Make sure that the number 2 diesel fuel you use meets the following minimum requirements.

MINIMUM REQUIREMENTS FOR NO.2 DIESEL FUEL:

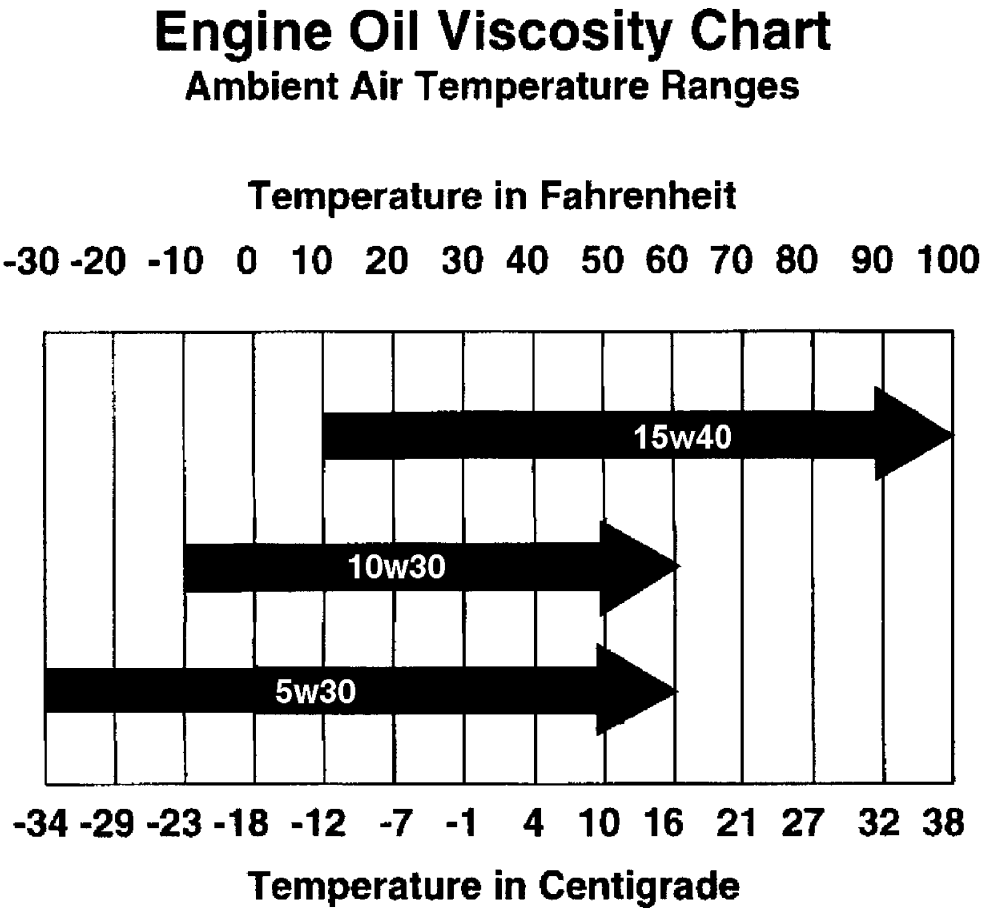
Maximum cloud point	-10°F (-23°C)
Maximum pour point	42°F (6°C) below the lowest ambient air temperature at which the engine must start
Cetane number, min	40 (45 to 55 in winter or at high altitude)
Max. sulphur content, by weight	0.50%
Max. water content & sediment by volume	0.05%
Max, ash content, by weight	0.01%
Max. carbon residue (10% point)	0.20%
Distillation temperature @ 90% point	540 to 625°F (282-329°C)
Distillation temperature @ end point	675°F (357°C)
Minimum flash point	125°F (52°C)
Viscosity at 100°F (38°C)	
Centistokes	2.0 to 4.3
Saybolt Universal Seconds (SUS)	32 to 40
Copper strip test, 3 hours @ 212°F (100°C)	No 3 ASTM
Minimum API gravity	30

ENGINE OIL SPECIFICATION

Use multigrade engine oil with API engine oil service classification CI-4.

NOTE: DO NOT use performance additives or other oil additives in your engine crankcase.

See the chart below for recommended oil viscosity at the various ambient air temperature ranges.



SAFETY, GENERAL

The information in this manual does not replace any safety rules and laws used in your area. Before operating this machine, learn the rules and laws for your area and make sure your machine has the correct equipment according to these rules and regulations. Before starting the engine study the operator's manual.

- Know the location and function of all machine controls.
- Clear the area of other persons before you start the engine.
- Check all controls in a safe area before you operate the machine.
- Understand the limits of the machine.
- Do not try to do too much too fast.
- Keep the machine under control at all times.

The following decal is located on the left side of the machine on the fuse box door. Check the decal daily. Clean or replace as needed.

SPARK ARRESTER

NOTE: Rules or laws in some areas may require that this machine be equipped with a spark arrester or spark arrester muffler. Check the rules or laws in your area.

PERSONAL

⚠ CAUTION

Loose clothing and jewelry can cause an accident. Do not wear loose clothing or jewelry that can catch on controls, etc. Do wear safety shoes, hard hat, heavy gloves, etc. when required for your protection.

Foreign materials and loose objects on the steps, hand rails, and in the operator's compartment can cause accidents and injury. Keep the steps, hand rails, and operator's compartment clear at all times.

Make sure cab windows are clean and unobstructed.

Know and understand the arrangements for movement of trucks, machines, and persons on your job site. Understand and follow the instructions of flagmen, road signs, or signals.

⚠ WARNING

Check machine controls for proper operation prior to working the machine.

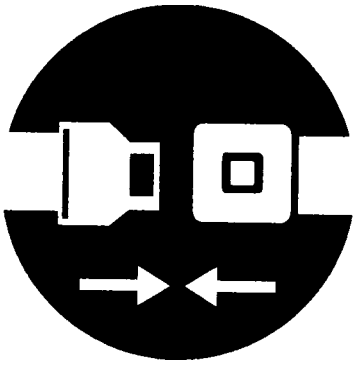
A fire can cause injury or death. Always have a fire extinguisher on the job site near the machine. Make sure the fire extinguisher is serviced according to the manufacturer's instructions.

Holes, obstructions, debris, and other work area hazards can cause injury or death. Always walk-around and look for these and other hazards before you operate your machine in a new work area.

Lack of, or incomplete, machine inspection and maintenance can cause accidents. Always follow the instructions in this manual for machine inspection and maintenance.

Always use the seat belt when operating the machine. Make sure the buckle is fully secured.

The following decal is located on the instrument panel. Check the decal daily. Clean or replace as needed.



Always wear the proper ear protection when operating this machine. Permanent hearing loss can result from extended exposure to loud noises.

The following decal is located on the instrument panel on machines without cabs. Check the decal daily. Clean or replace as needed.

MACHINE OPERATION

⚠ CAUTION

Dust, smoke, fog, etc. can decrease your vision and cause an accident. Always stop or slow the machine until you can clearly see your work area and the surrounding traffic.

WARNING

Operate the controls from the operator's seat only, and keep your hands on the controls during operation.

The following decal is located on the right side of the operator seat box. Check the decal daily. Clean or replace as needed.

Do not permit other people to ride on the machine as passengers.

Sparks from the electrical system or engine exhaust can cause a fire or explosion. Before you operate this machine in an area with flammable dust or vapors, use good ventilation to remove the flammable dust or vapors.

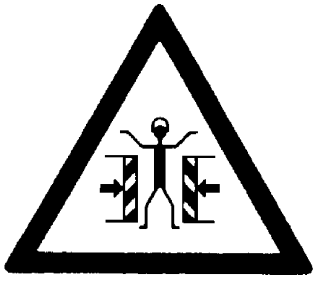
Engine exhaust fumes can cause injury or death. If you operate this machine in an enclosed area, use good ventilation to replace the exhaust fumes with fresh air.

The vibrations from this machine can cause the walls of a trench or high bank to collapse. Make sure the walls of the trench or bank are braced. If you do not follow these instructions, you can cause personal injury or death to persons working in these areas.

This machine uses an articulating joint. Keep all persons clear of this pinch area when the engine is running. Machine movement can cause personal injury.

The following decal is located on each side of the machine's front frame in the articulation joint area. Check the decals daily. Clean or replace as needed.

The following decal is also located on both sides of the rear frame in the area of the articulation joint and symbolizes the danger of the pinch point. Check the decals daily. Clean or replace as needed.



DANGER

A machine out of control can cause injury or death. You must make a judgement if weather and earth conditions will permit safe operation on a hill, ramp, or rough ground. Adjust machine operation accordingly.

Operating this machine too close to High Voltage electrical lines can cause injury or death. Follow the guide lines listed below.

NOTE: IF THE CLEARANCES IN THE SPECIFICATIONS BELOW ARE LESS THAN THE CLEARANCES GIVEN IN THE RULES AND LAWS OF YOUR AREA, YOU MUST FOLLOW THE RULES AND LAWS OF YOUR AREA!

Table 1: Electrical Safety Rules

Cable Voltage	Minimum Clearance From Cable When Machine is Working	Minimum Clearance From Cable When Transporting Machine
50,000 volts or less	10 feet (3 meters)	4 feet (1.2 meters)
50,000 volts to 345,000 volts	10 feet (3m) plus 1/2 inch (13mm) for every 1000 volts over 50,000 volts	10 feet (3 meters)
345,000 volts to 750,000 volts	10 feet (3m) plus 1/2 inch (13mm) for every 1000 volts over 50,000 volts	16 feet (5 meters)

MAINTENANCE

WARNING

Engine fuel is flammable and can cause a fire or an explosion. Do not fill the fuel tank or service the fuel system while the machine is running, or near an open flame, welding, burning cigars and cigarettes, etc.

Machine movement without an operator can cause injury or death. If you must service this machine with the engine running, have another person help you and follow the instructions in the machine manuals. Lock the articulation joint and do not leave the machine when the engine is running.

Improper service or repair can cause injury or death. If you do not understand the service procedures for this machine, see your Vibromax dealer.

Flammable cleaning solvents can cause a fire hazard. Use nonflammable cleaning solvents for cleaning purposes.

Missing shields, guards, or access panels can cause injury or death. Always install all shields, guards, or access panels before you start the engine.

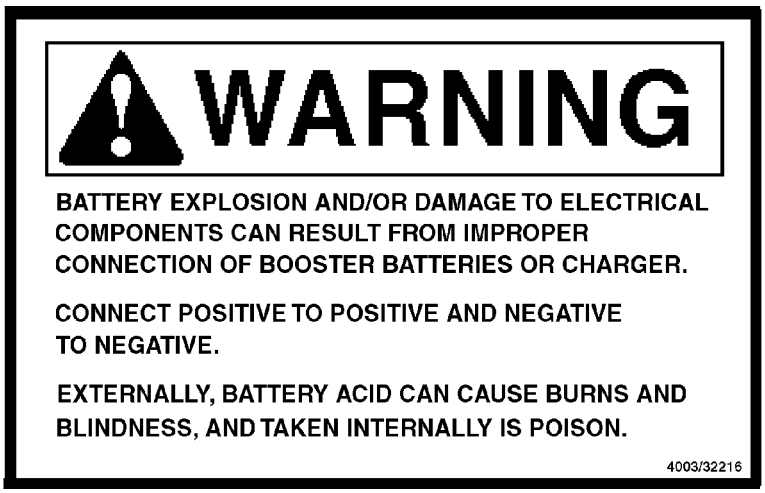
Do not make any modifications or repairs to the machine ROPS. If your ROPS is damaged, replace it with new parts. Welding, drilling, etc. can weaken the ROPS structure.

Metal chips or debris can cause eye injury. Wear eye protection when you service this machine. If you use a hammer to drive hardened pins or for other service, use a hammer with a soft face (brass, plastic, etc.).

Unauthorized modifications to cast iron parts can cause injury or death. Welding can cause cast iron parts to break. Do not use welding to repair or attach items to cast iron parts on this machine.

Batteries produce explosive gases. Protect from and keep flames away. Ventilate when charging. Always wear eye protection when working near batteries. Do not wear jewelry or watch bands when working on batteries.

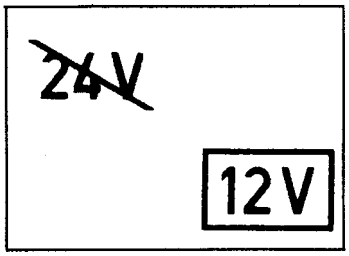
The following decal is located inside the battery box door. Check the decal daily. Clean or replace as needed.



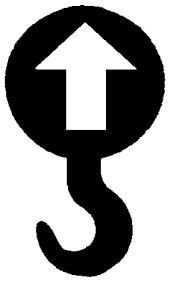
When you install a battery or use a booster battery, connect the negative ground cable last. When you remove a battery or booster battery, disconnect the negative ground cable first.

Never charge or jump a battery when the electrolyte is frozen. If you do not follow this instruction the battery can explode.

The following decal is located inside the battery box door and shows that this machine has a 12 volt electrical system. Check the decal daily. Clean or replace as needed.

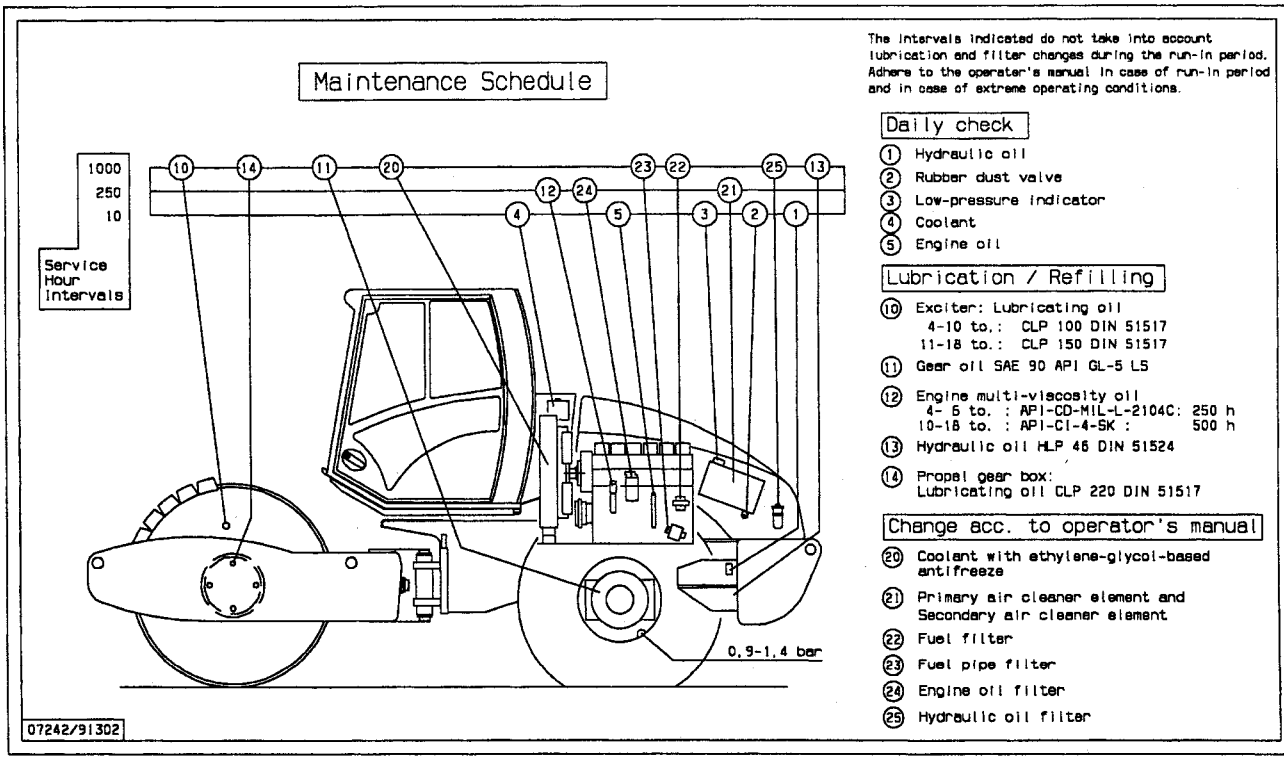


The following decal is located in six places on the machine at the lift and anchor points. Check the decals daily. Clean or replace as needed



DANGER

Unauthorized modifications to this machine can cause injury or death. Never make modifications to this machine without prior written approval from Vibromax.


Maintenance Schedule
The intervals indicated do not take into account lubrication and filter changes during the run-in period. Adhere to the operater's manual in case of run-in period and in case of extreme operating conditions.
Service Hour Intervals
1000
250
10
0,9-1,4 bar
07242/91302
Daily check
1 Hydraulic oil
2 Rubber dust valve
3 Low-pressure indicator
4 Coolant
5 Engine oil
Lubrication / Refilling
10 Exciter: Lubricating oil
4-10 to.: CLP 100 DIN 51517
11-18 to.: CLP 150 DIN 51517
11 Gear oil SAE 90 API GL-5 LS
12 Engine multi-viscosity oil
4- 5 to. : API-CD-MIL-L-2104C: 250 h
10-18 to. : API-CI-4-SK : 500 h
13 Hydraulic oil HLP 46 DIN 51524
14 Propel gear box:
Lubricating oil CLP 220 DIN 51517
Change acc. to operator's manual
20 Coolant with ethylene-glycol-based antifreeze
21 Primary air cleaner element and Secondary air cleaner element
22 Fuel filter
23 Fuel pipe filter
24 Engine oil filter
25 Hydraulic oil filter

MAINTENANCE SCHEDULE

The intervals given in this maintenance schedule must not be exceeded. If the machine is operated under severe conditions (high temperature, dust, water, etc.) shorten the interval.

As Required
Clean the machine
Fill the fuel tank
Service the air cleaner if warning light is lit
Service the hydraulic oil filter if warning light is lit
Check the torque of the wheel nuts

Every 10 hours or daily
Complete a daily walk around inspection
Check the condition of the machine's seat belt
Check air and water hoses
Clean or replace decals that cannot be read
Check the engine oil level
Check the hydraulic reservoir oil level
Check the drum scrapers
Check tire condition and pressure
Check the condition of the engine belts
Clean the rubber dust valve on air cleaner
Check the wheel nuts
Check the coolant reservoir fluid level

After the first 250 hours of operation
Change the oil in the drum gearbox
Change engine oil
Replace the engine oil filter

Every 250 hours of operation
Check axle oil levels
Check engine mounts
Check charge air cooler system
Check fuel injection pump mounting
Clean battery and check fluid level
Check the oil in the drum gearbox
Check the rubber buffers on the drum

After the first 500 hours of operation
Change oil in the rear axle

Every 500 hours of operation

Change engine oil *

* Engine oil change intervals are based on normal use with API CI-4 oil . Change intervals should be shortened to 250 hours during extreme operating conditions.

Replace the engine oil filter
Drain the water from the fuel tank
Clean the fuel filler inlet strainer

Every 1000 hours of operation or once each year

Replace the fuel filters
Check the ROPS
Check the operator's seat
Check drum vibration frequency
Change the vibration system oil
Change the hydraulic oil filter
Change the hydraulic oil
Clean the hydraulic oil filler screen
Change oil in the rear axle
Check and clean cooling system (outside)
Change the oil in the drum gearbox
Complete a Cummins service check

Every 2000 hours of operation

Clean and flush cooling system
Change engine coolant