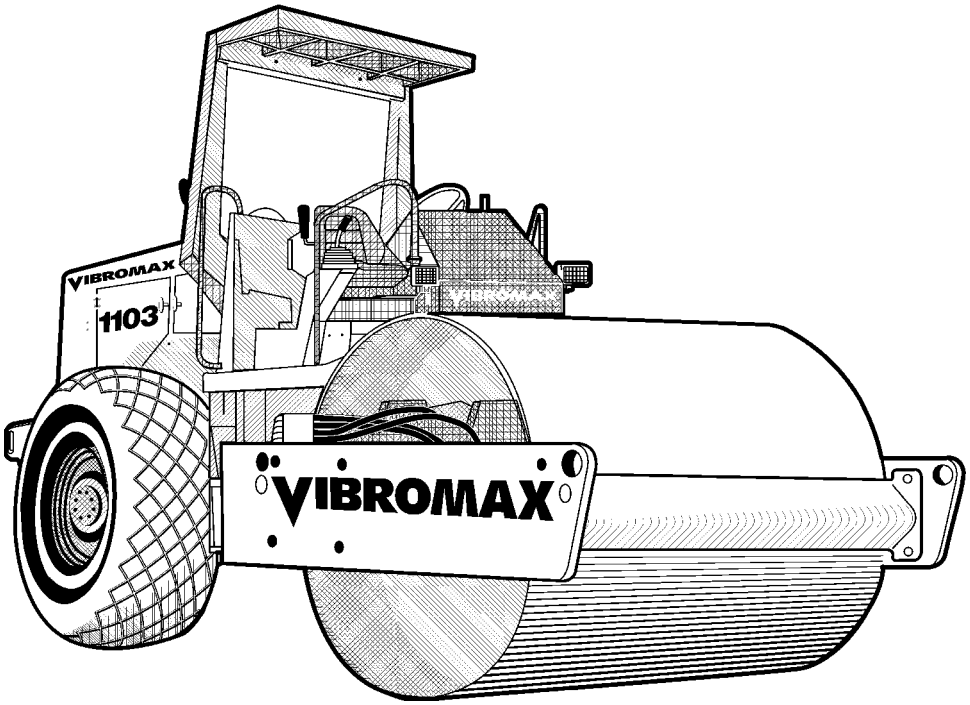
Open front screen

VIBROMAX

# 1103 SINGLE DRUM ROLLER

***SERVICE MANUAL SM90001***

**July 1998**



**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.

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# SECTION ONE

# GENERAL INFORMATION

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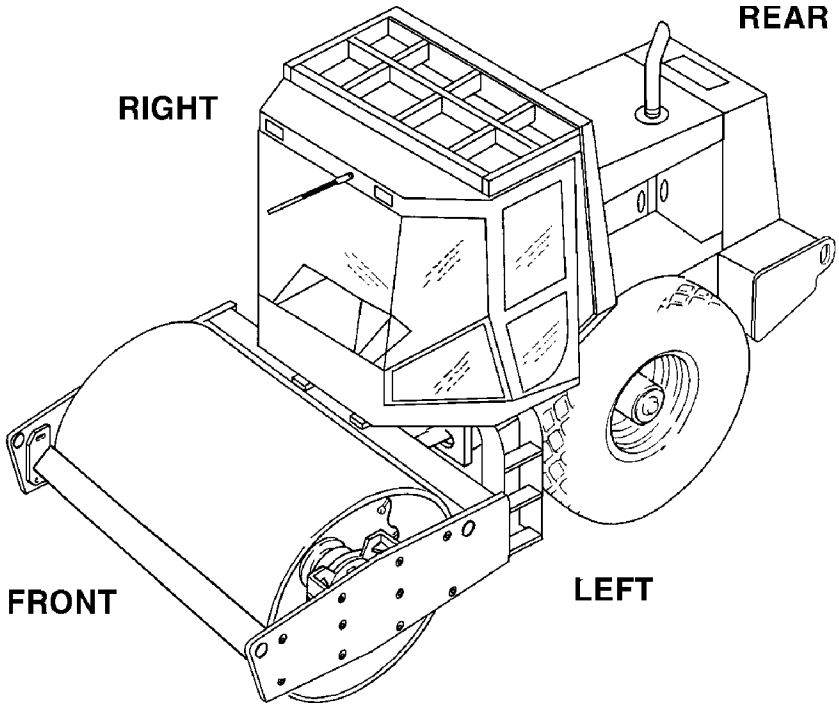
## MACHINE DESCRIPTION




The 1103 Vibratory Roller is the replacement for the 1102. Like the 1102, the 1103 is available in smooth drum or pad foot drum configuration. The 1103 however, is also offered with a standard Speth axle or a heavy duty Speth axle for high gradeability applications.

The 1103 uses the Cummins 5.9 liter 6 cylinder turbocharged engine at 130 gross horsepower. Changes in the drive pump and the addition of a heavy duty axle drive motor result in improved machine performance. The vibratory drum diameter remains the same and drum width is two inches narrower. The drum's centrifugal force has been increased 22%.

A Sauer Sundstrand Series 90 variable displacement, axial piston hydrostatic pump, used for machine propulsion, is mounted to the flywheel end of the engine. It provides oil to a Poclain MS25 drum drive motor and a Sauer Sundstrand 2 speed axle drive motor in a parallel path. The Poclain motor is mounted on the left side of the drum and is isolated from the drum by rubber buffers. The axle drive motor on the standard axle has a displacement of 80 cc while the motor on the heavy duty axle displaces 110cc.

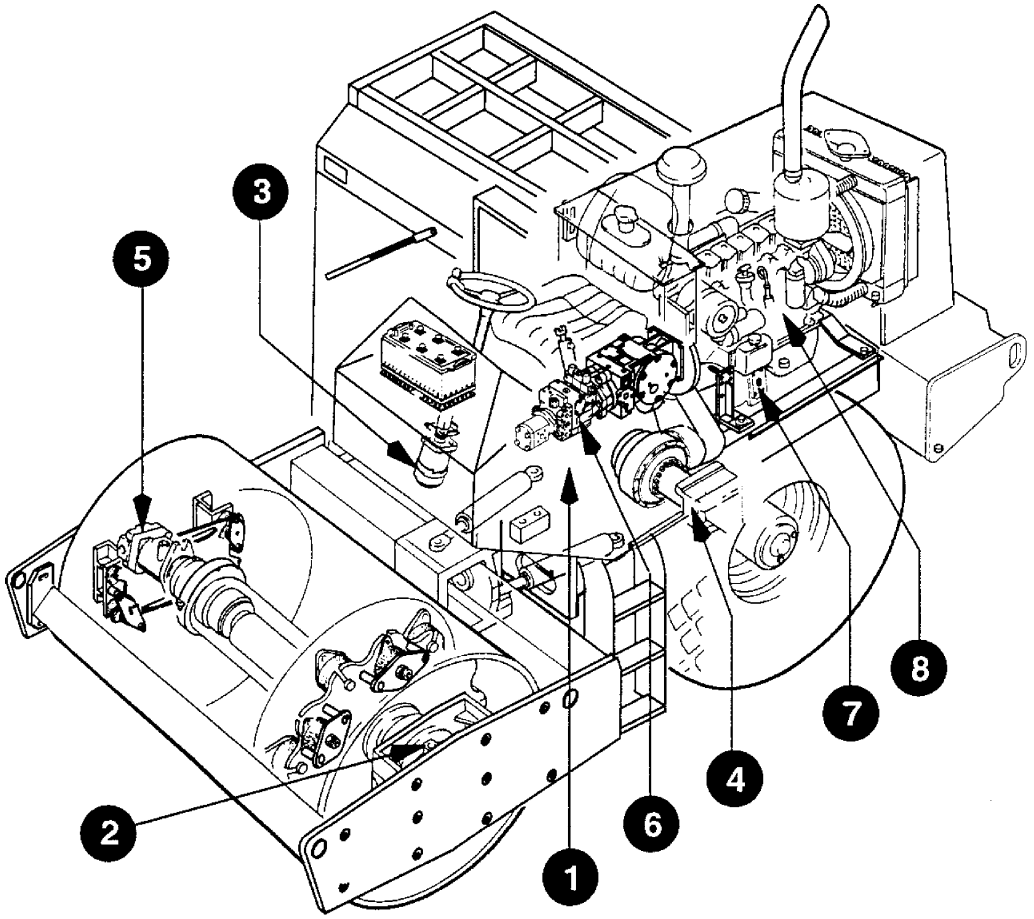
The vibration system uses a Sauer Sundstrand Series 90 hydrostatic pump similar to the propulsion pump and mounted directly behind the propulsion pump. The vibratory pump supplies oil to a Sauer Sundstrand hydrostatic motor mounted at the right side of the drum. Like the 1102, the 1103 smooth drum operates at frequencies of 1680 or 2160 vibrations per minute,

while the pad foot version operates only at the lower frequency.
A steering pump, mounted to the rear of the vibration pump, provides the oil needed for steering. The steering pump is also a second charge pump in the propulsion/vibration circuit. 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. The charge pump draws oil from reservoir, joins the steering oil at the filter, passes it through the filter and into the charge circuit.

The 1103 has 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. The standard axle machine uses a spring applied-hydraulically released band brake at the intermediate gearbox while the heavy duty axle incorporates multiple disc brakes at the intermediate gearbox.

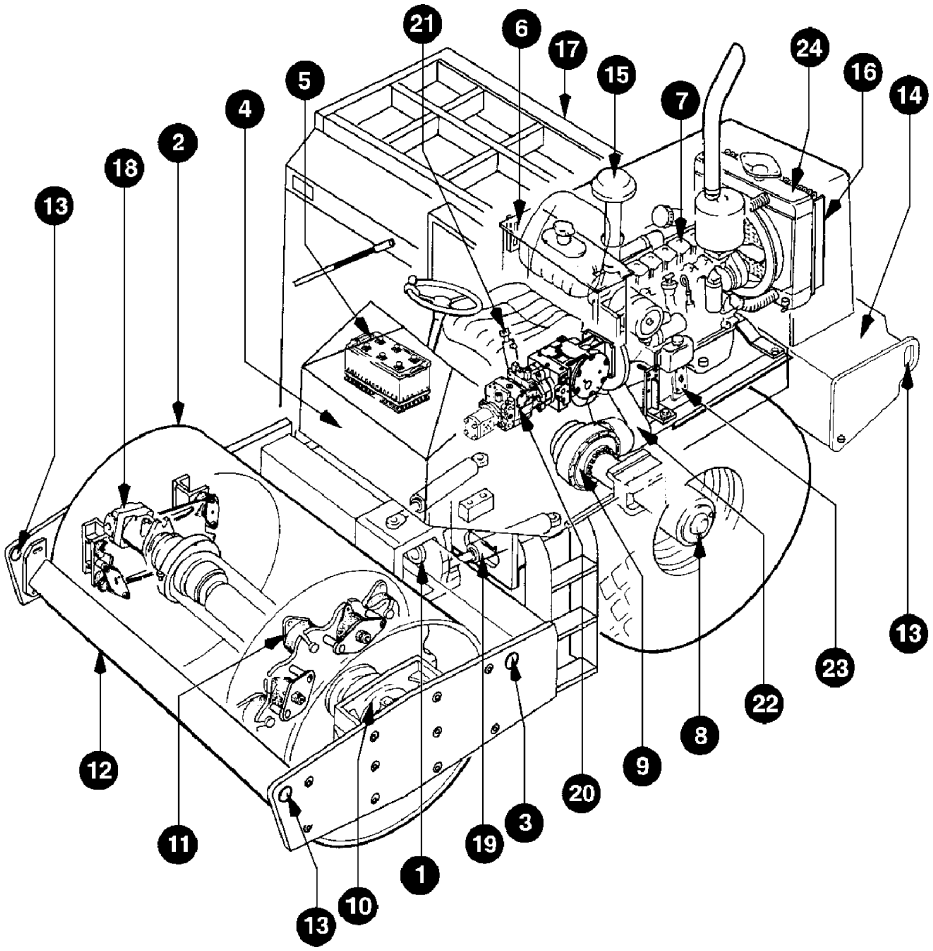
Pressure testing of the 1103 has been made easier by placing all the test ports at a centrally located test station under the operators platform on the right side of the machine.

The electrical system of the 1103 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 | 13 | Lifting and towing eyes |
| 2 | Smooth drum | 14 | Fuel tank |
| 3 | Lifting eye | 15 | Air filter system |
| 4 | Operator's stand | 16 | Hydraulic oil cooler |
| 5 | Battery | 17 | Roll over protective structure |
| 6 | Hydraulic tank | 18 | Vibration motor |
| 7 | Engine | 19 | Steering cylinder |
| 8 | Planetary gear | 20 | Hydraulic pumps |
| 9 | Differential | 21 | Parking brake cylinder |
| 10 | Drum drive motor | 22 | Intermediate gear box |
| 11 | Isolation buffer | 23 | Axle drive motor |
| 12 | Scraper | 24 | Radiator |

## SAFETY, GENERAL

The information in this manual does not replace any safety rules and laws used in your area. Before you operate 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.

***Your safety and the safety of other persons in the work area are dependent on your correct operation of this machine.***

- 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.

### SPARK ARRESTER

***NOTE: Rules or laws in some areas can make it necessary for this machine to be equipped with a spark arrester or spark arrester muffler. Check the rules or laws in your area.***

## SAFETY, PERSONAL

**⚠ WARNING** ***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.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***Always use the seat belt when operating the machine. Make sure the buckle for the seat is fastened correctly.***

**⚠ WARNING** ***Make sure cab windows are clean and unobstructed.***

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

**⚠ WARNING** ***Check machine controls for proper operation prior to starting the machine.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***Electrical cables, gas pipes, water pipes, sewers, or other underground objects can cause injury or death. Know the location of underground hazards before you operate your machine in a new work area.***

**⚠ WARNING** ***Not doing, or wrong machine inspection and maintenance can cause accidents. Always follow the instructions in this manual for machine inspection and maintenance.***

## SAFETY, MACHINE OPERATION

**⚠ WARNING** ***Dust, smoke, fog, etc. can decrease your vision and cause an accident. Always stop or slow the machine until you can 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.***

**⚠ WARNING** ***Do not permit other persons to ride on the machine.***

**⚠ WARNING** ***Look at the instruments and gauges frequently when you operate. Make sure all systems are in the proper operating range.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***Operating your machine in, on, or near a trench, high bank, or overhang is extra dangerous and can cause injury or death. You must make a judgement if your machine can be safely operated near any of these areas. Use wall supports if necessary.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***The vibrations from this machine can cause the walls of a trench or high bank to collapse. If you must operate this machine close to a trench or high bank, 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.***

**⚠ WARNING** ***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!***

**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) |

## SAFETY, 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.***

**⚠ WARNING** ***Flammable cleaning solvents can cause injury or death. Use nonflammable cleaning solvents for cleaning purposes.***

**⚠ WARNING** ***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.***

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

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

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

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

**⚠ WARNING** ***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.).***

**⚠ WARNING** ***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.***

**⚠ WARNING** ***Batteries produce explosive gases. Keep sparks and flame away. Ventilate when charging. Always wear eye protection when working near batteries. Do not wear jewelry or watch bands when working on batteries.***

**⚠ WARNING** ***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.***

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

**⚠ WARNING** ***Never wear rings or other jewelry when working on machine maintenance. Severe burns can result when jewelry is shorted on an electrical system.***

**⚠ WARNING** ***Never wear loose clothing which can catch on objects or be tangled in moving parts.***

**⚠ WARNING** ***Use suitable floor (service) jacks and safety stands when lifting the machine off the ground.***

**⚠ WARNING** ***Hydraulic oil under pressure can penetrate the skin. If hydraulic oil has penetrated the skin, seek medical treatment immediately. Do not use your hands to check for hydraulic leaks, use a piece of cardboard or wood.***

**⚠ WARNING** ***Keep your work area clean and free of spilled oil and grease to avoid accidentally slipping.***

## GENERAL INFORMATION

### CLEANING

Clean all metal parts, except bearings, in mineral spirits or by steam cleaning. Do not use caustic soda for steam cleaning. After cleaning, dry and put oil on all parts. Clean oil passages with compressed air. Clean bearings in kerosene, dry the bearings completely and put oil on the bearings.

### INSPECTION

Check all parts when the parts are disassembled. Replace all parts that have wear or damage. Small scoring or grooves can be removed with a hone or crocus cloth. Complete visual inspection for indications of wear and pitting. Replacement of bad parts will prevent early failure.

### BEARINGS

Check bearings for easy movement. If bearings have a loose fit or rough action replace the bearing. Wash bearings in kerosene and allow to air dry. DO NOT USE COMPRESSED AIR TO DRY BEARINGS.

### NEEDLE BEARINGS

Before pressing needle bearings into a bore always remove any metal protrusions in the bore or edge of the bore. Before pressing bearing lubricate the inner and outer diameters as needed.

### GEARS

Check all gears for wear and damage. Replace gears that have wear or damage.

### OIL SEALS, O-RINGS, & GASKETS

Always install new oil seals, o-rings and gaskets. Put petroleum jelly or the specified oil on seals and o-rings.

### SHAFTS

Check all shafts that have wear damage. Check the surfaces where bearings and oil seals operate for signs of wear.

### SERVICE PARTS

Always install genuine Vibromax service parts. When ordering refer to the parts manual for the correct part numbers. Failure to use genuine Vibromax replacement parts can void your warranty.

### LUBRICATION

Use the oils and lubricants specified in the Operator's or Service Manual. Failures due to the use of non specified lubricants are not covered by warranty.

## 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 |

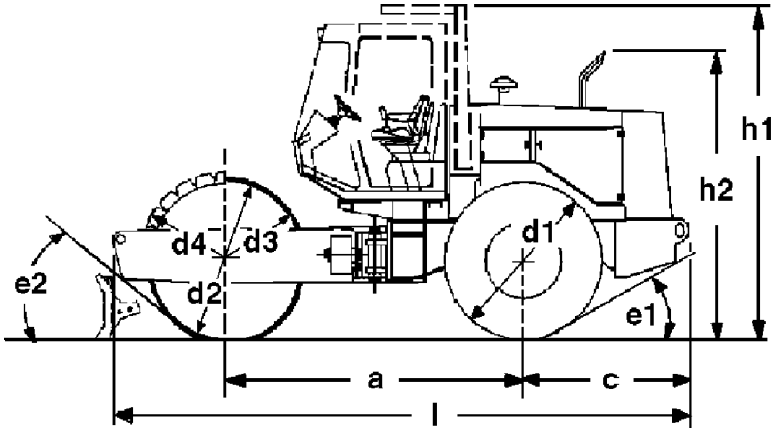
## FITTINGS, CONNECTIONS AND PLUGS

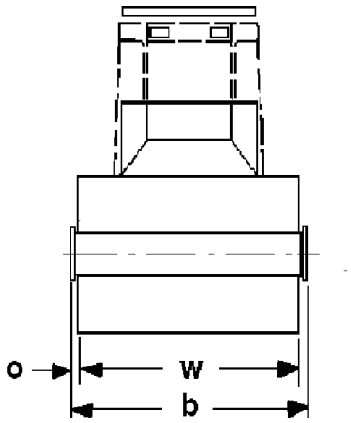
| DIAMETER & PITCH | NEWTONS/METER | POUNDS/FOOT |
|---|---|---|
| 10MM X 1 | 20 | 14.5 |
| 12MM X 1.5 | 35 | 26 |
| 14MM X 1.5 | 45 | 33.2 |
| 16MM X 1.5 | 60 | 44 |
| 18MM X 1.5 | 70 | 51 |
| 22MM X 1.5 | 100 | 73 |
| 27MM X 2 | 200 | 147 |
| 33MM X 2 | 280 | 207 |
| 42MM X 2 | 380 | 281 |

## 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 |

## MACHINE SPECIFICATIONS




| | inch | mm |
|---|---|---|
| a | 112 | 2845 |
| b | 88.6 | 2250 |
| c | 62.2 | 1580 |
| d1 | 59.8 | 1520 |
| d2 | 59.1 | 1500 |
| d3 | 55.1 | 1400 |
| d4 | 63 | 1600 |
| h1 | 123.6 | 3140 |
| h2 | 106.3 | 2700 |
| k | 18.1 | 216.5 |
| l | 216.5 | 5500 |
| o | 3 | 75 |
| s | 1 | 25 |
| w | 82.7 | 2100 |
| e1 | 30 | 30 |
| e2 | 40 | 40 |

## ENGINE DATA

| | |
|---|---|
| Make / Model / Type | Cummins 6BT5.9C, 6 cylinder, turbo diesel |
| Cooling | Water |
| Displacement - cu.in. (cc) | 359 (5880) |
| HP, SAE net (kW) @ 2500 rpm | 122 (91) |
| Air Cleaner | Dual replacement elements |
| Fuel filter | Spin-on Cartridge |
| Fuel consumption gal/hr (l/hr) | 5.3 (19.5) |
| Fuel Capacity - gal (liter) | 74 (280) |
| Electrical system | 12 volt |

## DRIVE SYSTEM DATA

| | **1103D/1103HD** | **1103PD/1103HPD** |
|---|---|---|
| Propulsion - front and rear | Infinitely variable hydrostatic | Infinitely variable hydrostatic |
| Travel speed 1st. - mph (km/hr) | 0 - 3.1 (0-5) | 0 - 3.3 (0-5.5) |
| Travel speed 2nd. - mph (km/hr) | 0 - 6 (0-9) | 0 - 6.6 (0-11) |
| Theoretical gradeability, forward -% | 45/65 | 45/65 |
| Brakes, front drum | hydraulic disc | hydraulic disc |
| Brakes, rear 1103 | hydraulic drum, intermediate shaft | hydraulic drum, intermediate shaft |
| Brakes, rear 1103H | hydraulic disc, intermediate shaft | hydraulic disc, intermediate shaft |
| Steering | Articulated, hydraulic powered | Articulated, hydraulic powered |
| Tire size | 23.1x26 8PR diamond tread | 23.1x26 8PR tractor tread |

## OPERATING DATA

| | 1103D/1103HD | | 1103PD/1103HPD |
|---|---|---|---|
| Operating Weight - lbs (kg) | 24475 (11100)/25740 (11700) | | 25300 (11500) / 26620 (12100) |
| Weight, front - lbs (kg) | 12789 (5813) | | 13668 (6212) |
| Static linear drum load - lb/in (kg/cm) | 155 (27.6) | | ---------- |
| Drum wt, unsprung - lbs (kg) | 7055 (3206) | | 7934 (3606) |
| Articulation/oscillation - degrees | 37/15 | | 37/15 |
| Turning radius, inside - ft (m) | 12 (3.7) | | 12 (3.7) |
| Drum shell thickness - in. (mm) | 1.0 (25) | | 1.0 (25) |
| Number of pad feet/height of foot - in (mm) | ---------- | | 144/4.0 (100) |
| Contact area of foot - sq. in (sq. cm) | ---------- | | 14.8 (95) |
| | 1st stage | 2nd stage | 1st stage |
| Max compaction depth - in (cm) | 39 (100) | 23.6 (60) | 39 (100) |
| Frequency - vpm (Hz) | 1680 (28) | 2160 (36) | 1680 (28) |
| Nominal Amplitude - in. (mm) | .063 (1.6) | .023 (0.6) | .063 (1.6) |
| Centrifugal force - lbf (kN) | 47211 (210) | 24053 (107) | 47211 (210) |
| Centrifugal force/drum width - lb/in (N/cm) | 570 (1000) | 291 (510) | 570 (1000) |
| Total applied force - lb/in (N/cm) | 60000 (267) | 36842 (164) | 60879 (271) |
| Total applied linear force | 725 (1271) | 445 (781) | 736 (1290) |

## FLUID SPECIFICATIONS

| MACHINE PART | CAPACITY USA (metric) | SPECIFICATIONS |
|---|---|---|
| Fuel tank | 74 gal (280 l) | see diesel fuel |
| Engine crankcase | 15 qts(14.2 l) | engine oil<br>API classification API-CD MIL-L-2104C<br>multigrade engine oil (see oil chart)<br>single grade engine oil (see oil chart) |
| Hydraulic system<br><br>Reservoir only | 29.1 gal (110 l)<br><br>18.5 gal (70 l) | cold weather HLP 46 DIN 51524/2<br>hot weather HLP 68 DIN 51524/2<br>Mobil DTE 25,26<br>Shell Tellus OL 46,68<br>Amoco Rykon HD 46,68<br>Texaco Rando HD 46,68 |
| Vibration system | 12.7 qts. (12 l) | CLP DIN 51517/3<br>Mobil Gear 629<br>Shell Omala 150<br>Texaco Meropa 150 |
| Battery | as required | Distilled water |
| Grease | as required | KP3K DIN 51502<br>Mobil Oil - Mobilux 3<br>Shell Oil - Alvania 3<br>Texaco Oil - Starplex 3 |
| Engine coolant | 20 qts (19 l) | 50% ethylene glycol and 50% water |
| Tire ballast | see chart | Calcium Chloride (77%$CaCl^2$ ) |
| Intermediate gear<br>standard duty<br>heavy duty<br><br>Axle gear<br>standard duty<br>heavy duty<br><br>Planetary gear<br>standard duty<br>heavy duty | <br>1.1 qts (1 ltr)<br>1.6 qts (1.5 ltr)<br><br><br>5.3 qts (5 ltr)<br>14.8 qts (14 ltr)<br><br><br>2.2 qts (2 ltr)<br>1.9 qts (1.8 ltr) | SAE 90 API GL-5 gear lubricant |

## 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.

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**

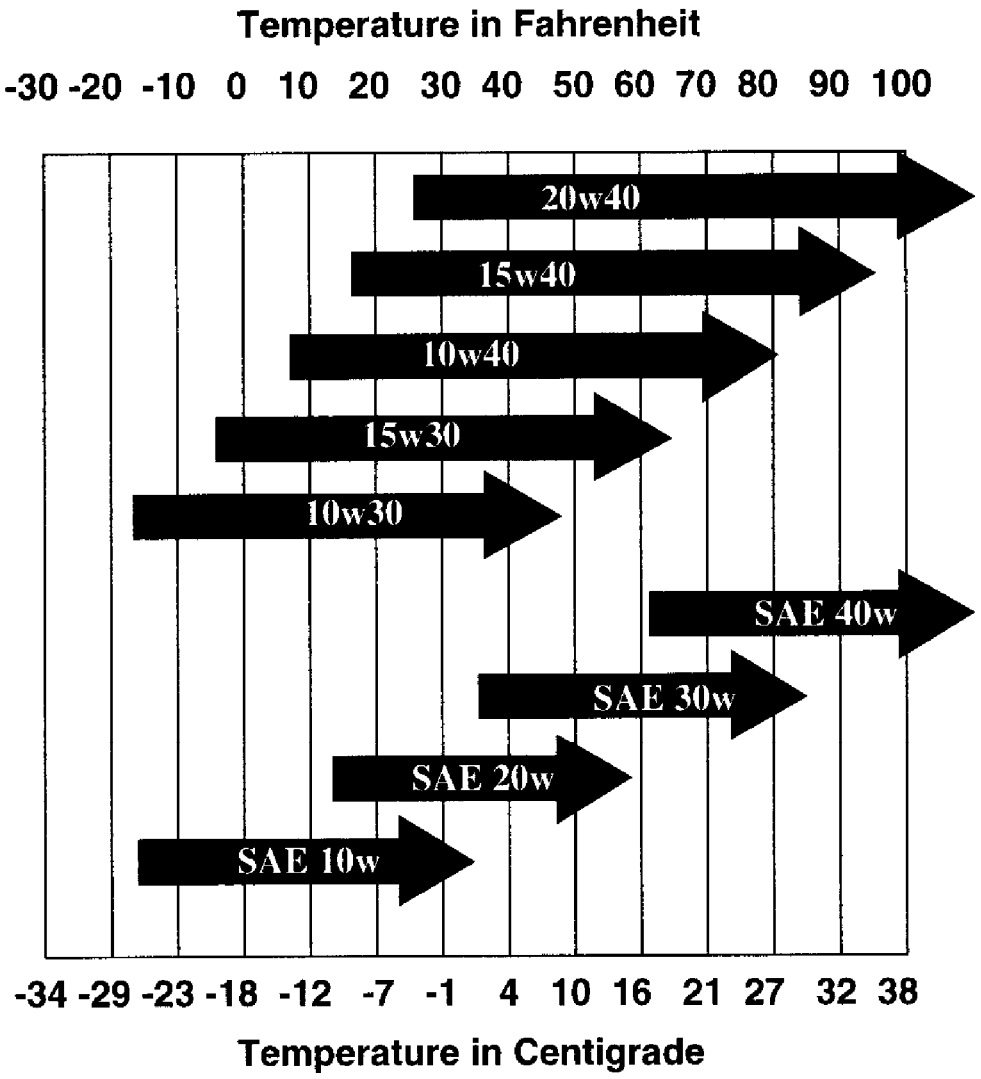
Use multigrade or single grade engine oil with API engine oil service classification “CD”.

**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 range

## Engine Oil Viscosity Chart

### Ambient Air Temperature Ranges



## TIRE BALLAST

Refer to the weight chart below for the maximum weight of tire ballast that you can add to the machine. The Calcium choride will prevent freezing of the ballast to -30$^{o}$ F (-34$^{o}$ C). Tire pressure is set at 13 to 20 PSI (0.9 to 1.40 bar). See your Vibromax dealer for more information.

***NOTE: The following information is for one tire only and for a tire size of 23.1-26 AW 8PR.***

| Water | | Calcium Chloride | | Total Mixture Weight | |
|---|---|---|---|---|---|
| **Liters** | **US Gal.** | **kg** | **Lbs** | **kg** | **Lbs** |
| 484.5 | 128 | | | 481.7 | 1062 |
| 412.6 | 109 | 173.3 | 382 | 585.2 | 1291 |
| 389.9 | 103 | 233.6 | 515 | 623.3 | 1374 |

# SECTION TWO

# ENGINE

**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.

## CUMMINS ENGINE WARRANTY

All Cummins Engines manufactured by Cummins Diesel and installed in Vibromax products are covered by Cummins warranty and are to be serviced by an Authorized Cummins Servicing Dealer and/or Distributor. The engines used in Vibromax equipment have a two (2) year warranty period.

Warranty on Cummins engines begins when any of the following conditions are met:

* a claim is submitted to Cummins
* engine has accumulated 50 running hours
* unit is rented, leased, or retailed
* Cummins representatives perform a start-up service

Cummins engine warranty is transferable throughout its term. Terms are not adjustable nor reversible.

Start up Service is not required at the start of warranty on the engine. Warranty service is provided by your local Cummins Service Outlet. If you require assistance with locating a Service Outlet, call the Cummins Customer Relations Department, 1-800-343-7357.

**ENGINE DATA**

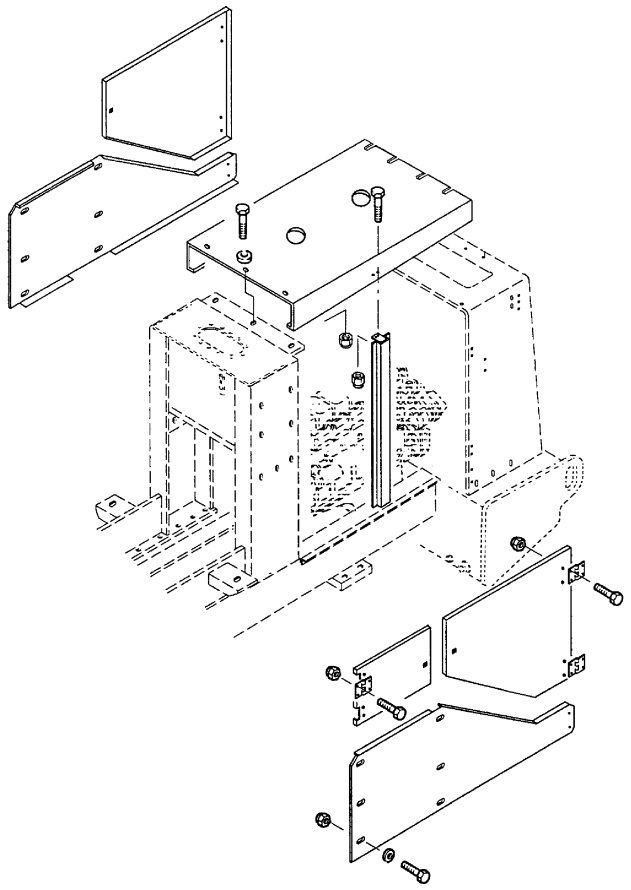
| | |
|---|---|
| Make / Model / Type | Cummins 6BT5.9C, 6 cylinder, turbo diesel |
| Cooling | Water |
| Displacement - cu.in. (cc) | 359 (5880) |
| HP, SAE net (kW) @ 2500 rpm | 122 (91) |
| Air Cleaner | Dual replacement elements |
| Fuel filter | Spin-on Cartridge |
| Fuel consumption gal/hr (l/hr) | 5.3 (19.5) |
| Fuel Capacity - gal (liter) | 74 (280) |
| Electrical system | 12 volt |

It is not the intent or purpose of this manual to supersede the manufacturers technical instruction for repair or overhaul of this engine. After the expiration of warranty, those wishing to do their own engine service work should obtain the Cummins Shop Manual for the “B” series engine from their local Cummins distributor.

## ENGINE REMOVAL

1. Disconnect the negative battery cable. The battery is located on the operator platform to the right side of the seat.

2. Remove the engine compartment hood and side panels.



3. Drain the engine cooling system. A drain valve is provided and is located to the rear side of the radiator overflow tank on the left side of the machine.

4. Drain the engine oil using the fitting provided in the left rear frame behind the tire. After the oil has been drained disconnect the drain hose from the engine oil pan.