CEBM020001

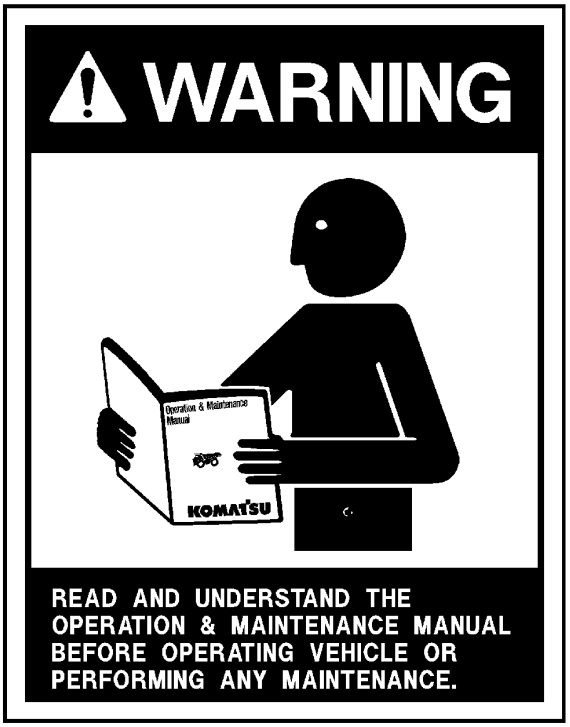
Shop Manual

930E-4SE

DUMP TRUCK

SERIAL NUMBERS **A30587 - A30677**

KOMATSU®



Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read and understand this manual before operating or maintaining this machine.

This manual should be kept in or near the machine for reference, and periodically reviewed by all personnel who will come into contact with it.

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

CALIFORNIA
Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

⚠WARNING

NON-OEM PARTS IN CRITICAL SYSTEMS

For safety reasons, Komatsu America Corp. strongly recommends against the use of non-OEM replacement parts in critical systems of all Komatsu equipment. Critical systems include but are not limited to steering, braking and operator safety systems.

Replacement parts manufactured and supplied by unauthorized sources may not be designed, manufactured or assembled to Komatsu's design specifications; accordingly, use of such parts may compromise the safe operation of Komatsu products and place the operator and others in danger should the part fail.

Komatsu is also aware of repair companies that will rework or modify an OEM part for reuse in critical systems. Komatsu does not generally authorize such repairs or modifications for the same reasons as noted above.

Use of non-OEM parts places full responsibility for the safe performance of the Komatsu product on the supplier and user. Komatsu will not in any case accept responsibility for the failure or performance of non-OEM parts in its products, including any damages or personal injury resulting from such use.

FOREWORD

This manual is written for use by the operator and/or the service technician. It is designed to help these persons to become fully knowledgeable of the truck and all of its systems in order to keep it operating safely and efficiently. All operators and maintenance personnel should read and understand the information in this manual before operating the truck or performing maintenance and/or operational checks on the truck. All safety notices, warnings, and cautions should be understood and followed when operating the truck or performing repairs on the truck.

The first section covers component descriptions, truck specifications and safe work practices, as well as other general information. The major portion of the manual pertains to disassembly, service and reassembly. Each major serviceable area is dealt with individually. For example, the disassembly, service and reassembly of the radiator group is discussed as a unit. The same is true of the engine and engine accessories, and so on through the entire mechanical detail of the truck. Disassembly should be carried only as far as necessary to accomplish needed repairs.

The illustrations used in this manual are *typical* of the component shown and may not be an *exact* reproduction of what is found on the truck.

This manual shows dimensioning of U.S. standard and metric (SI) units throughout. All references to “right,” “left,” “front,” or “rear” are made with respect to the operator's normal seated position unless specifically stated otherwise.

When assembly instructions are provided without references to specific torque values, standard torque values should be used. Standard torque values are shown in torque charts in the General Information section of this manual. Specific torques, when provided in the text, are in bold face type, such as **135 N•m (100 ft lbs)**. All torque specifications have ±10% tolerance unless otherwise specified.

A product identification plate is located on the frame in front of the right side front wheel. It designates the Truck Model Number, Product Identification Number (vehicle serial number), and Maximum GVW (Gross Vehicle Weight) rating.

The KOMATSU truck model designation consists of three numbers and one letter (i.e. 930E).

The three numbers represent the basic truck model.

The letter “E” designates an Electrical wheel motor drive system.

The Product Identification Number (vehicle serial number) contains information which identifies several characteristics of this unit. For a more detailed explanation, see the end of Section A4.

The Gross Vehicle Weight (GVW) is what determines the load on the drive train, frame, tires, and other components. The vehicle design and application guidelines are sensitive to the maximum GVW.
GVW is *total weight*: **empty vehicle weight + fuel & lubricants + payload.**

To determine the *allowable payload*, fill all lubricants to the proper level and fill the fuel tank of an empty truck (which includes all accessories, body liners, tailgates, etc.), and then weigh the truck. Record this value and subtract it from the GVW. The result is the allowable payload.

NOTE: Accumulations of mud, frozen material, etc, become part of the GVW and reduces the allowable payload. To maximize payload and to keep from exceeding the maximum GVW rating, these accumulations should be removed as often as practical.

Exceeding the allowable payload will reduce the expected life of truck components.

This "ALERT" symbol is used with the signal words, "DANGER", "WARNING", and "CAUTION" in this manual to alert the reader to hazards arising from improper operating and maintenance practices.

DANGER

"DANGER" identifies a specific potential hazard WHICH WILL RESULT IN EITHER INJURY OR DEATH if proper precautions are not taken.

WARNING

"WARNING" identifies a specific potential hazard WHICH MAY RESULT IN EITHER INJURY OR DEATH if proper precautions are not taken.

CAUTION

"CAUTION" is used for general reminders of proper safety practices OR to direct the reader's attention to avoid unsafe or improper practices which may result in damage to the equipment.

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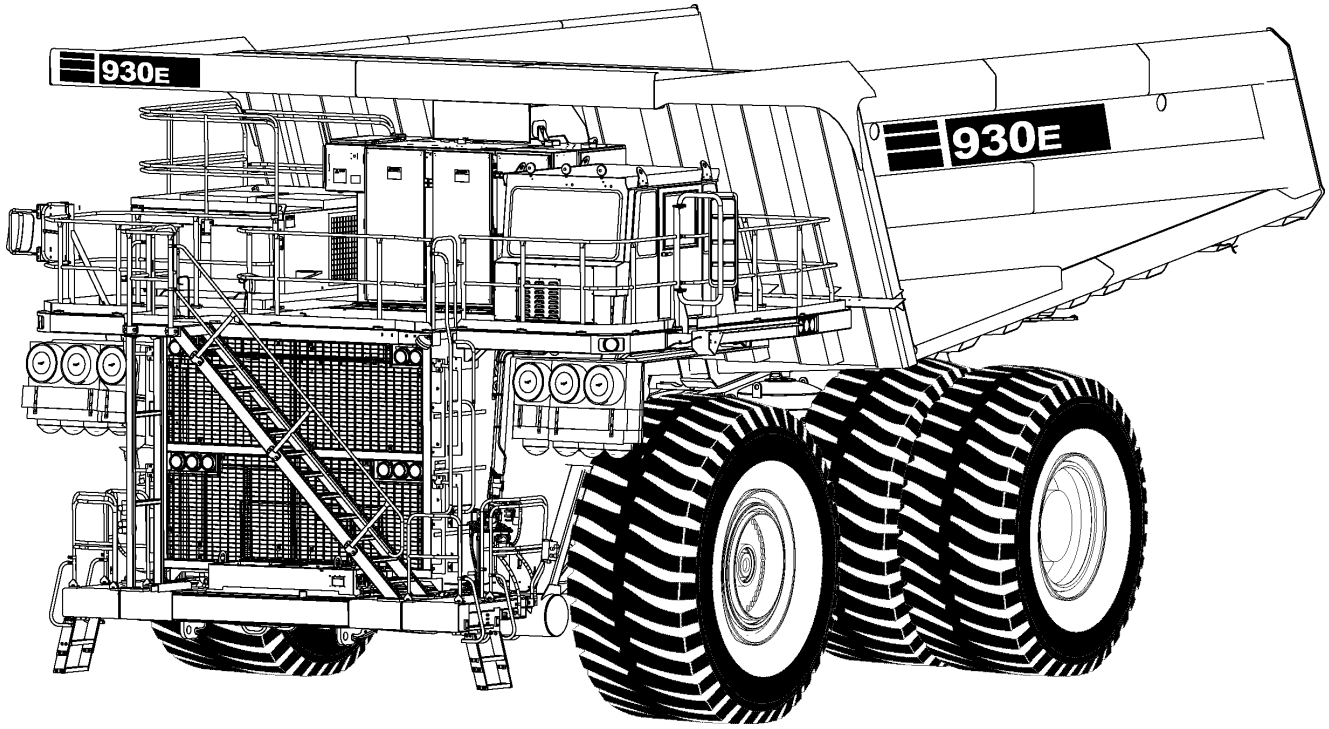


KOMATSU MODEL 930E-4SE DUMP TRUCK

SECTION A
GENERAL INFORMATION
INDEX

NOTES

MAJOR COMPONENTS & SPECIFICATIONS

TRUCK AND ENGINE

The 930E-4SE Dump Truck is an off-highway, rear dump truck with AC Electric Drive. The gross vehicle weight is 1,114,670 lbs. (505,611 kg). The engine is a Komatsu SSDA18V170 rated @ 3500 HP (2611 kW).

MAIN ALTERNATOR

The diesel engine drives an in-line alternator at engine speed. The alternator produces AC current which is rectified to DC within the main control cabinet. The rectified DC power is converted back to AC by groups of devices called "inverters", which are also within the main control cabinet. Each inverter consists of six phase modules under the control of a gate driver power converter (GDPC). The two GDPCs control the operation of each phase module.

Each phase module contains paired positive and negative semiconductor switches referred to as insulated gate bipolar transistors (IGBT). The IGBTs cycle on and off at varying frequencies to create an AC power signal from the DC supply.

The AC power signal produced by each inverter is a variable-voltage, variable-frequency (VVVF) signal. Frequency and voltage are changed to suit the operating conditions.

Cooling air for the control/power group and wheel motors, as well as the alternator itself, is provided by dual fans mounted on the alternator shaft.

AC INDUCTION TRACTION MOTORIZED WHEELS

The alternator output supplies electrical energy to the two wheel motors attached to the rear axle housing. The motorized wheels use three-phase AC induction motors with full-wave AC power.

The two wheel motors convert electrical energy back to mechanical energy through built-in gear trains within the wheel motor assembly. The direction of the wheel motors is controlled by a directional control lever located on the center console.

SUSPENSION

Hydrair II® suspension cylinders located at each wheel provide a smooth and comfortable ride for the operator and dampens shock loads to the chassis during loading and operation.

OPERATOR'S CAB

The operator cab has been engineered for operator comfort and to allow for efficient and safe operation of the truck. The cab provides wide visibility with an integral 4-post ROPS/FOPS structure and an advanced analog operator environment. It includes a tinted safety-glass windshield and power-operated side windows, a deluxe interior with a fully adjustable seat with lumbar support, a fully adjustable/tilt steering wheel, controls mounted within easy reach of the operator, and an analog instrument panel which provides the operator with all instruments and gauges which are necessary to control and/or monitor the truck's operating systems.

POWER STEERING

The truck is equipped with a full time power steering system which provides positive steering control with minimum operator effort. The system includes nitrogen-charged accumulators which automatically provide emergency power if the steering hydraulic pressure is reduced below an established minimum.

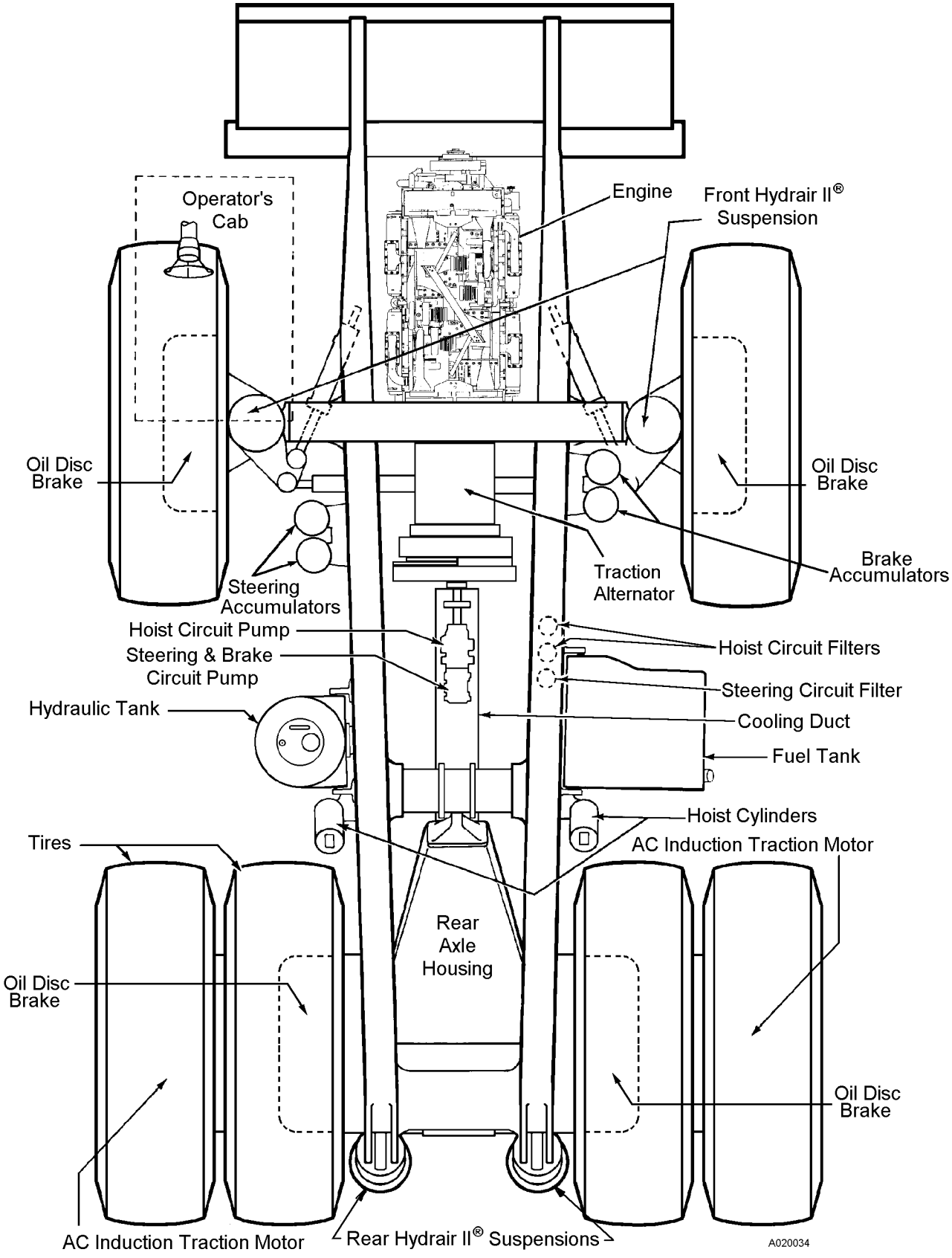
DYNAMIC RETARDING

The dynamic retarding is used to slow the truck during normal operation or control speed coming down a grade. The dynamic retarding ability of the electric system is controlled by the operator through the activation of the retarder pedal (or by operating a lever on the steering wheel) in the operators cab and by setting the RSC (Retarder Speed Control). Dynamic retarding is automatically activated, if the truck speed goes to a preset overspeed setting.

BRAKE SYSTEM

Service brakes at each wheel are oil-cooled multiple disc brakes applied by an all-hydraulic actuation system. Depressing the brake pedal actuates both front and rear brakes after first applying the retarder. All wheel brakes will be applied automatically if the brake system pressure decreases below a preset minimum.

The parking brake is a dry disc type, mounted inboard on each rear wheel motor, and is spring-applied and hydraulically-released with wheel speed application protection (will not apply with truck moving).


Operator's Cab
Engine
Front Hydrair II®
Suspension
Oil Disc Brake
Oil Disc Brake
Brake Accumulators
Traction Alternator
Steering Accumulators
Hoist Circuit Pump
Steering & Brake Circuit Pump
Hoist Circuit Filters
Steering Circuit Filter
Hydraulic Tank
Cooling Duct
Fuel Tank
Hoist Cylinders
Tires
AC Induction Traction Motor
Rear Axle Housing
Oil Disc Brake
Oil Disc Brake
AC Induction Traction Motor
Rear Hydrair II® Suspensions
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SPECIFICATIONS

These specifications are for the standard Komatsu 930E-4SE Truck. Customer options may change this listing.

ENGINE

Komatsu SSDA18V170

No. of Cylinders 18
Operating Cycle 4-Stroke
Rated Brake HP . . . . . 3500 HP (2611 kW) @ 1900 RPM
Flywheel HP . . . . . 3429 HP (2558 kW) @ 1900 RPM
Weight (Wet)* . . . . . 10,000 kg (22,266 lbs)

* Weight does not include Radiator, Sub-frame, or Alternator.

AC ELECTRIC DRIVE SYSTEM

(AC/DC Current)

Alternator . . . . . General Electric GTA-39
Dual Impeller, In-Line Blower . . . . . 453 m³/ min (16,000 cfm)
Motorized Wheels . . . . . GDY106 AC Induction Traction Motors
Standard Gear Ratio* 32.62:1
Maximum Speed . . . . . 64.5 km/h (40 mph)

* Wheel motor application depends upon GVW, haul road grade and length, rolling resistance, and other parameters. Komatsu and GE must analyze each job condition to ensure proper application.

DYNAMIC RETARDING

Electric Dynamic Retarding . . . . . Standard
Maximum Rating . . . . . 5400 HP (4026 kW)
Continuous* . . . . . 3900 HP (2909 kW)

* Continuously rated high-density blown grids with retard at engine idle and retard in reverse propulsion.

BATTERY ELECTRIC SYSTEM

Batteries . . . . . Four 8D, 12 volt wet batteries with disconnect switch
Cold Cranking Amps . . . . . 1450 CCA
Alternator . . . . . 24 Volt, 140 Amp Output
Lighting . . . . . 24 Volts
Starters (2) . . . . . 24 Volts

SERVICE CAPACITIES

Crankcase (including lube oil filters) . . . . . 341 liters (90 gallons)
Cooling System . . . . . 799 liters (211 gallons)
Fuel . . . . . 5300 liters (1400 gallons)
Hydraulic System . . . . . 1325 liters (350 gallons)
Wheel Motor Gear Box . . . . . 95 liters (25 gallons) per wheel

HYDRAULIC SYSTEMS

Hoist and Brake Cooling Pump . . . . . Tandem Gear
Rating . . . . . 931 L/min (246 gpm) @ 1900 RPM and 17,237 kPa (2500 psi)
Steering/Brake Pump . . . . . Pressure Compensated Piston
Rating . . . . . 246 L/min (65 gpm) @ 1900 RPM and 18,961 kPa (2750 psi)
Relief Pressure - Hoist . . . . . 17,237 kPa (2500 psi)
Relief Pressure - Steering/Brake . . . . . 27,579 kPa (4000 psi)
Hoist Cylinders (2) . . . . . 3-Stage Hydraulic
Tank (Vertical/Cylindrical) . . . . . Non-Pressurized
Tank Capacity . . . . . 947 liters (250 gallons)
Filtration . . . . . In-line replaceable elements
Suction . . . . . Single, Full Flow, 100 Mesh
Hoist and Steering Filters (Dual In-Line, High Pressure) . . . . . Beta $_{12}$ Rating =200

SERVICE BRAKES

All Hydraulic Actuation with Traction System Wheel Slip/Slide Control
Front and Rear Oil-Cooled Multiple Discs on each wheel
Total Friction Area / Brake . . . . . 97,019 cm² (15,038 in²)
Maximum Apply Pressure. . . . . 17,238 kPa (2500 psi)

STEERING

Twin hydraulic cylinders with accumulator assist to provide constant rate steering
Emergency power steering automatically provided by accumulators
Turning Circle (SAE). . . . . 30.4 m (97 ft. 7 in.)

TIRES

Radial Tires (standard) 53/80 R63
Rock Service, Deep Tread . . . . . Tubeless
Rims . . . . . patented Phase I New Generation™ rims

STANDARD DUMP BODY CAPACITIES AND DIMENSIONS

Capacity

Heaped @ 2:1 (SAE). . . . . 211 m^3 (276 yd^3)
Struck . . . . . 171 m^3 (224 yd^3)
Width (Inside) . . . . . 8.15 m (26 ft. 9 in.)
Depth . . . . . 3.2 m (10 ft. 7 in.)
Loading Height . . . . . 7.06 m (23 ft. 2 in.)
Dumping Angle . . . . . 45°

NOTE: Optional capacity dump bodies are available.

WEIGHT DISTRIBUTION

Empty Vehicle

Front Axle (48.5%). . . . . 104,460 kg (230,293 lbs)
Rear Axle (51.5 %) . . . . . 110,848 kg (244,377 lbs)
Total (with 50% fuel) . . . . . 215,308 kg (474,670 lbs)

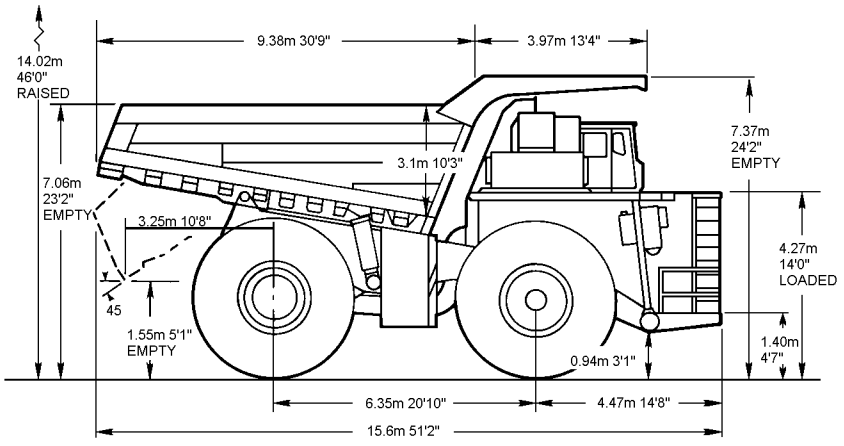
Standard Komatsu body . . . . 30,362 kg (66,936 lbs)
Standard tire weight. . . . . 26,127 kg (57,600 lbs)

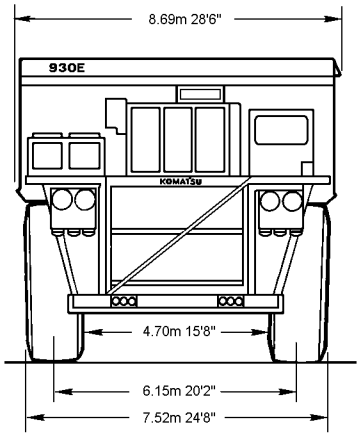
Loaded Vehicle

Front Axle (32.8%) . . . . . 165,958 kg (365,871 lbs)
Rear Axle (67.2%) . . . . . 339,653 kg (748,799 lbs)
Total . . . . . .505,611 kg (1,114,670 lbs)

Nominal Payload*. . . . . .290,302 kg (640,000 lbs)

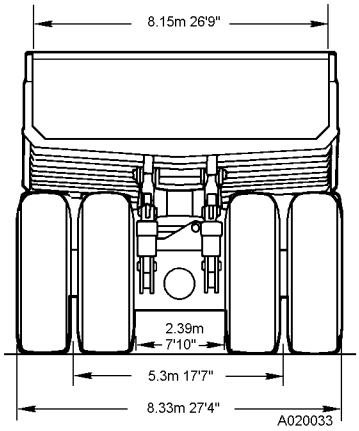
* *Nominal payload* is defined within Komatsu America Corporation's payload policy documentation. Nominal payload must be adjusted if the weight of any customized body or tires vary from that of the standard Komatsu body and tires. Nominal payload must also be adjusted to take into account the additional weight of any custom/optional extras fitted to the truck which are not stated within the Standard Features list of the applicable specification sheet.





All Dimensions with 171/211m³ 224/276 yd³ Body

BODIES	Struck		2:1 Heap		Loading Height	
	M³	Yd³	M³	Yd³	M	Feet
Standard	171	224	211	276	7.06	23'2"



NOTES

SAFETY

GENERAL

Safety records from most organizations will show that the greatest percentage of accidents are caused by unsafe acts performed by people. The remainder are caused by unsafe mechanical or physical conditions. Report all unsafe conditions to the proper authority.

The following safety rules are provided as a guide for the operator. However, local conditions and regulations may add many more to this list.

⚠WARNING

Read and follow all safety precautions. Failure to do so may result in serious injury or death.

Safety Rules

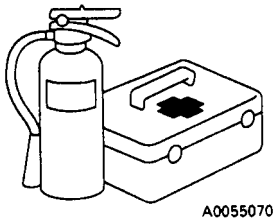
- Only trained and authorized personnel may operate and maintain the truck.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the truck.
- When working with another operator or a person on work site traffic duty, make sure that all personnel understand all hand signals that are to be used.

Safety Features

- Make sure that all guards and covers are in their proper position. Have any damaged guards and covers repaired. (See Operating Instructions - “Preparing For Operation”.)
- Learn the proper use of safety features such as safety locks, safety pins, and seat belts. Use these safety features properly.
- Never remove any safety features. Always keep them in good operating condition.
- Improper use of safety features could result in serious bodily injury or death.

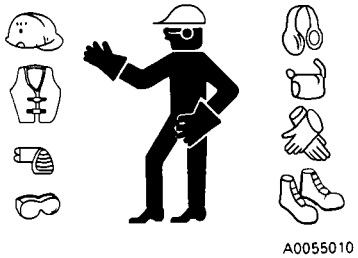
Fire Extinguisher And First Aid Kit

- Make sure that fire extinguishers are accessible and proper usage techniques are known.
- Provide a first aid kit at the storage point.
- Know what to do in the event of a fire.
- Keep the phone numbers of persons you should contact in case of an emergency on hand.



Clothing And Personal Items

- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death. Also, never wear oily clothes as they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask and gloves when operating or maintaining a truck. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials--particularly when driving pins with a hammer or when cleaning air cleaner elements with compressed air. Also, ensure that the work area is free from other personnel during such tasks.



Leaving The Operator’s Seat

When preparing to leave the operator's seat, do not touch any control lever that is not locked. To prevent accidental operations from occurring, always perform the following:

- Move the directional control lever to PARK. **Do not use the wheel brake lock when the engine will be turned off.**
- Lower the dump body to the frame.
- Stop the engine. When exiting the truck, always lock compartments and take the keys with you. If the truck should suddenly move or move in an unexpected way, this may result in serious bodily injury or death.

Mounting And Dismounting

- Use the handrails and steps when getting on or off the truck.
- Never jump on or off the truck. Never climb on or off a truck while it is moving.
- When climbing on or off a truck, face the truck and use the hand-hold and steps.
- Never hold any control levers when getting on or off a truck.
- Always maintain three-point contact with the hand-holds and steps to ensure that you support yourself.
- When bringing tools into the operator's compartment, always pass them by hand or pull them up by rope.
- If there is any oil, grease, or mud on the hand-holds or steps, wipe them clean immediately. Always keep these components clean. Repair any damage and tighten any loose bolts.

Fire Prevention For Fuel And Oil

- Fuel, oil, and antifreeze can be ignited by a flame. Fuel is extremely flammable and can be hazardous. Keep flames away from flammable fluids.
- Keep oil and fuel in a designated location and do not allow unauthorized persons to enter.
- When refueling, stop the engine and do not smoke.
- Refueling and oiling should be done in well ventilated areas.
- Tighten all fuel and oil tank caps securely.

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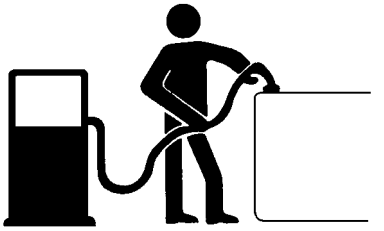

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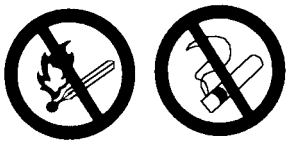

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Precautions With High Temperature Fluids

Immediately after truck operation, engine coolant, engine oil, and hydraulic oil are at high temperatures and are pressurized. If the cap is removed, the fluids are drained, the filters are replaced, etc., there is danger of serious burns. Allow heat and pressure to dissipate before performing such tasks and follow proper procedures as outlined in the service manual.


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To prevent hot coolant from spraying:

1. Stop the engine.
2. Wait for the coolant temperature to decrease.
3. Depress the pressure release button on the cap to vent cooling system pressure.
4. Turn the radiator cap slowly to release the pressure before removing.

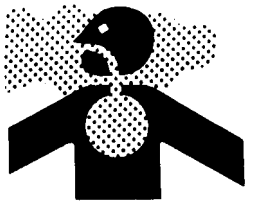
To prevent hot engine oil spray:

1. Stop the engine.
2. Wait for the oil temperature to cool down.
3. Turn the cap slowly to release the pressure before removing the cap.

Asbestos Dust Hazard Prevention

Asbestos dust is hazardous to your health when inhaled. If you handle materials containing asbestos fibers, follow the guidelines below:

- Never use compressed air for cleaning.
- Use water for cleaning to control dust.
- Operate the truck or perform tasks with the wind to your back whenever possible.
- Use an approved respirator when necessary.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Prevention Of Injury By Work Equipment

Never enter or put your hand, arm or any other part of your body between movable parts such as the dump body, chassis or cylinders. If the work equipment is operated, clearances will change and may lead to serious bodily injury or death.

Unauthorized Modification

Any modification made to this vehicle without authorization from Komatsu America Corp. can possibly create hazards.

Before making any modification, consult the authorized regional Komatsu America Corp. distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

Precautions When Using ROPS

The ROPS is intended to protect the operator if the truck should roll over. It is designed not only to support the load of the truck, but also to absorb the energy of the impact.

- The Rollover Protection Structure (ROPS) must be properly installed before the truck is operated.
- ROPS installed on equipment manufactured and designed by Komatsu America Corp. fulfills all of the regulations and standards for all countries. If it is modified or repaired without authorization from Komatsu, or if it is damaged when the truck rolls over, the strength of the structure will be compromised and will not be able to fulfill its intended purpose. Optimum strength of the structure can only be achieved if it is repaired or modified as specified by Komatsu.
- When modifying or repairing the ROPS, always consult your nearest Komatsu distributor.
- Even with the ROPS installed, the operator must always use the seat belt when operating the truck.

Precautions For Attachments

- When installing and using optional equipment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use attachments that are not authorized by Komatsu America Corp. or the authorized regional Komatsu distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the truck.
- Any injuries, accidents, and product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu America Corp. or the authorized regional Komatsu distributor.

Precautions For Starting The Truck

Start the engine from the operator's seat only. Never attempt to start the engine by shorting across cranking motor terminals. This may cause a fire, or serious injury or death to anyone in truck's path.

PRECAUTIONS BEFORE OPERATION

Safety is thinking ahead. Prevention is the best safety program. Prevent a potential accident by knowing the employer's safety requirements and all necessary job site regulations. In addition, know the proper use and care of all the safety equipment on the truck. Only qualified operators or technicians should attempt to operate or maintain a Komatsu machine.

Safe practices start before the operator gets to the equipment.

Safety At The Worksite

- When walking to and from a truck, maintain a safe distance from all machines even when the operator is visible.
- Before starting the engine, thoroughly check the area for any unusual conditions that could be dangerous.
- Examine the road surface at the job site and determine the best and safest method of operation.
- Choose an area where the ground is as horizontal and firm as possible before performing the operation.
- If you need to operate on or near a public road, protect pedestrians and cars by designating a person for work site traffic duty or by installing fences around the work site.
- The operator must personally check the work area, the roads to be used, and the existence of obstacles before starting operations.
- Always determine the travel roads at the work site and maintain them so that it is always safe for the machines to travel.
- If travel through wet areas is necessary, check the depth and flow of water before crossing the shallow parts. Never drive through water that exceeds the permissible water depth.