

Shop Manual

CEBM006700

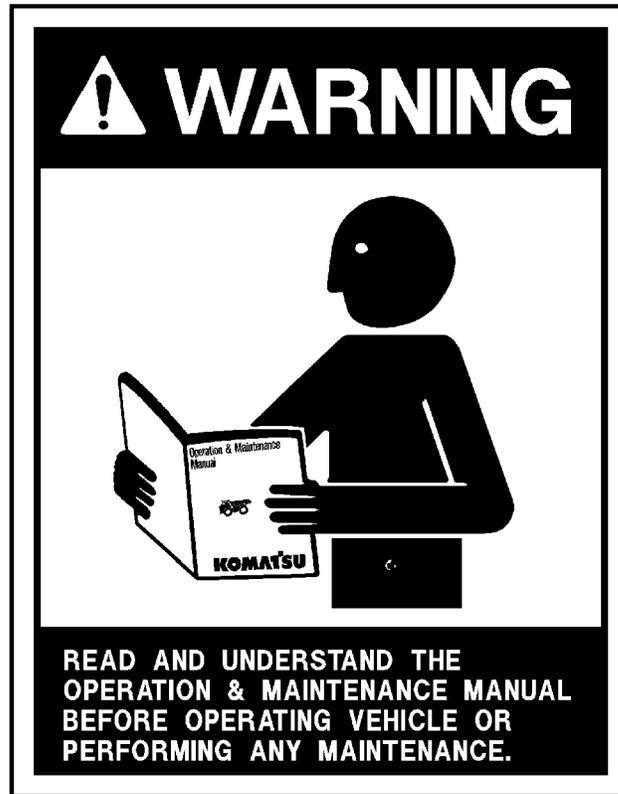


730E

DUMP TRUCK

SERIAL NUMBER **A30181** and up

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.***

This material is proprietary to Komatsu Mining Systems, Inc. and is not to be reproduced, used, or disclosed except in accordance with written authorization from Komatsu Mining Systems, Inc.

It is the policy of the Company to improve products whenever it is possible and practical to do so. The Company reserves the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

Because of continuous research and development, periodic revisions may be made to this publication. Customers should contact their local distributor for information on the latest revision.

**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.***

NOTES:

FOREWORD

This Shop Manual is written for use by the service technician and is designed to help the technician become fully knowledgeable of the truck and all its systems in order to keep it running and in production. All maintenance personnel should read and understand the materials in this manual before performing maintenance and/or operational checks on the truck. All safety notices, warnings and cautions should be understood and followed when accomplishing 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, at times, typical of the component shown and may not necessarily depict a specific model.

This manual shows dimensioning of U.S. standard and metric (SI) units throughout and all references to "Right", "Left", "Front", or "Rear" are made with respect to the operator's normal seated position, unless specifically stated otherwise.

Standard torque requirements are shown in torque charts in the general information section and individual torques are provided in the text in bold face type, such as **100 ft.lbs. (135 N.m)** torque. All torque specifications have $\pm 10\%$ tolerance unless otherwise specified.

A Product Identification plate is normally located on the truck frame in front of the right side front wheel and designates the Truck Model Number, Product Identification Number (vehicle serial number), and Maximum G.V.W. (Gross Vehicle Weight) rating.

The KOMATSU Haulpak Truck Model designation consists of three numbers and one letter (i.e. 730E). The three numbers represent the basic truck model. The letter "M" designates a Mechanical drive and the letter "E" designates an Electrical propulsion system.

The Product Identification Number (vehicle serial number) contains information which will identify the original manufacturing bill of material for this unit. This complete number will be necessary for proper ordering of many service parts and/or warranty consideration.

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 **total maximum Gross Vehicle Weight (GVW)** and this means the **total weight**: the Empty Vehicle Weight + the fuel & lubricants + the payload.

To determine allowable payload:

Service all lubricants for proper level and fill fuel tank of empty truck (which includes all accessories, body liners, tailgates, etc.) and then weigh truck.

Record this value and subtract from the GVW rating. The result is the allowable payload.

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

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



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



*“DANGER” identifies a specific potential hazard
WHICH WILL RESULT
in either INJURY OR DEATH
if proper precautions are not taken.*



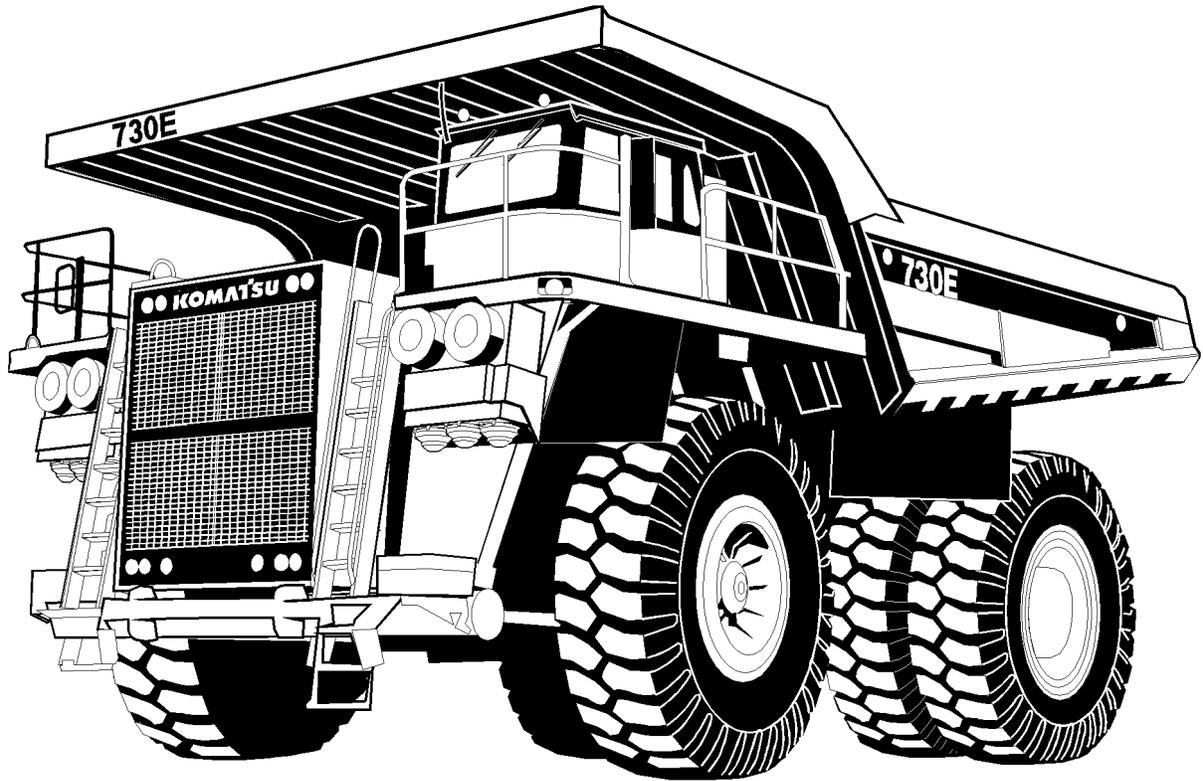
*“WARNING” identifies a specific potential hazard
WHICH MAY RESULT
in either INJURY OR DEATH
if proper precautions are not taken.*



*“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.*

TABLE OF CONTENTS

SUBJECT	SECTION
GENERAL INFORMATION	A
STRUCTURES	B
ENGINE, FUEL, COOLING AND AIR CLEANER	C
ELECTRIC SYSTEM (24 VDC. NON-PROPULSION)	D
ELECTRIC PROPULSION AND CONTROL	E
DRIVE AXLE, SPINDLES AND WHEELS	G
HYDRAIR [®] II SUSPENSIONS	H
BRAKE CIRCUIT	J
HYDRAULIC SYSTEM	L
OPTIONS AND SPECIAL TOOLS	M
OPERATOR'S CAB	N
LUBRICATION AND SERVICE	P
ALPHABETICAL INDEX	Q
SYSTEM SCHEMATICS	R



KOMATSU MODEL 730E Dump Truck

SECTION A

GENERAL INFORMATION

INDEX

TRUCK COMPONENT DESCRIPTION & SPECIFICATIONS	A2-1
GENERAL SAFETY AND TRUCK OPERATION	A3-1
WARNINGS AND CAUTIONS	A4-1
CHARTS AND TABLES	A5-1
STORAGE PROCEDURES	A7-1

NOTES

MAJOR COMPONENT DESCRIPTION

The Komatsu Model 730E Dump Truck is an electric drive, off-highway, rear dump truck whose gross vehicle weight is 715,000 lbs. (324 324 kg) rated for a maximum payload of 210 tons (190 t).

ENGINE

The Komatsu 730E is powered by a Komatsu SSA16V159 engine rated at 2000HP (1492 kW).

ALTERNATOR

The diesel engine drives an alternator mounted in-line with the engine. The alternating current (AC) output of the alternator is rectified to direct current (DC) and sent to the DC drive wheel motors.

WHEEL MOTORS (GE 788)

The output of the alternator supplies electrical energy to the two wheel motors attached to the rear axle housing. 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 forward or reverse hand selector switch located on a console to the right side of the operator.

BLOWER

The blower supplies cooling air for the rectifiers, AC alternator, and to both wheel motors, where it is then exhausted to atmosphere.

OPERATOR'S CAB

The Komatsu Operator's Cab has been engineered for operator comfort and to allow for efficient and safe operation of the truck.

The cab provides for 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 Komatsu 730E Dump Truck is equipped with a full time power steering system which provides positive steering control with a minimum of effort by the operator. 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 DC electric system is controlled by the operator through the activation of the retarder pedal in the operators cab and by setting the RSC (Retarder Speed Control). Dynamic Retarding is automatically activated if truck goes to a preset overspeed setting.

BRAKE SYSTEM

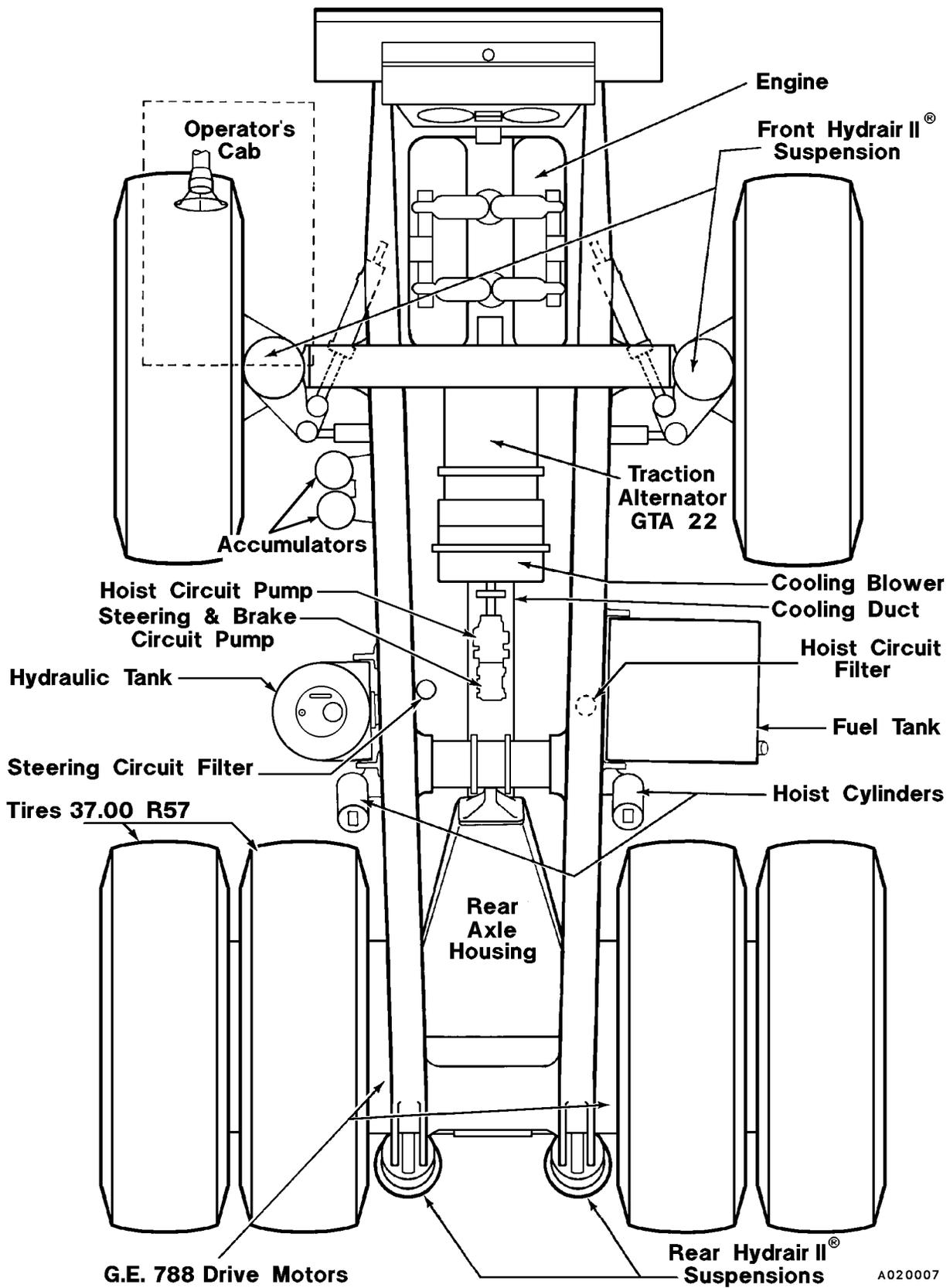
The wheel service brakes are caliper/dry disc brakes applied by an all hydraulic actuation system. Depressing the brake pedal actuates wheel-speed single disc front brakes and armature-speed dual disc rear brakes. The rear brakes can also be activated by operating a switch on the instrument panel.

All wheel brakes will be applied automatically if system pressure decreases below a preset minimum.

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

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.



730E MAJOR COMPONENTS

SPECIFICATIONS

These specifications are for the standard 730E Dump Truck. Customer Options may change this listing.

ENGINE

Komatsu SSA16V159

Number of Cylinders	16
Operating Cycle	4-Stroke
Rated Brake HP	2000 HP (1492 kW) @ 1900 RPM
Flywheel HP	1860 HP (1388 kW) @ 1900 RPM
Weight (Wet)	11,670 lbs. (5717 kg)

ELECTRIC DRIVE SYSTEM

STATEX III w/Fuelsaver AC/DC Current

Alternator	General Electric GTA - 22
Motorized Wheels	General Electric 788*
Standard Gear Ratio*	26.825:1
Maximum Speed	34.6 MPH (55.7 km/h)

* NOTE: Wheel motor application depends upon GWW, haul road grade, haul road length, rolling resistance, and other parameters.
Komatsu & G.E. must analyze each job condition to assure proper application.

DYNAMIC RETARDING

Electric Dynamic Retarding	Standard
Maximum Retarding	3700 HP (2759 kW)
With Continuous Rated (18 resistor) Blown Grids	
2-Speed Overspeed & Extended Range Retarding	
.	Reverse Retarding

BATTERY ELECTRIC SYSTEM

Batteries - bumper-mounted in polyethylene boxes	
.	Four 12 Volt Batteries in Series/Parallel
.	220 Ampere-Hour Capacity
.	With Disconnect Switch
Alternator	24 Volt, 110 Ampere Output
Lighting	24 Volt
Starters (2)	24 Volt

SERVICE CAPACITIES

	U.S. Gallons	Liters
Crankcase (Includes lube oil filters)		
Cummins	59.0	223
Cooling System	108	409
Fuel	850	3217
Hydraulic System	193	731
Wheel Motor Gear Box 10.5/Wheel		40/Wheel

HYDRAULIC SYSTEM

Pumps:

Hoist (gear type)	135.6 GPM (513 l/min.)
.	at 2500 psi (18 960 kPa) @ 1900 RPM
Steering/Brake (vane)	2750 psi (18 960 kPa)
.	@ 1900 RPM
Relief Pressure- Hoist	2500 psi (17.2 MPa)
Relief Press.- Steering/Brake	4000 psi (27.5 MPa)
Hoist	Two 3-Stage Hydraulic Cylinders
Tank	Vertical - Cylindrical, Non-Pressurized
Service Capacity	193 U.S. Gal. (731 Liters)
Filtration	In-line replaceable elements
Suction	Single, Full Flow, 100 Mesh
Hoist & Steering High Pressure Filters	
.	Dual, Full Flow, 7 Micron
.	Beta 12 rating = 200

SERVICE BRAKES

Actuation	All Hydraulic - Caliper/Disc
.	(Front) (Rear)
Type	Single Disc Dual Disc
.	Wheel Speed Armature Speed

STEERING

Turning Circle (SAE) 92 ft. (28.0 m)
Twin hydraulic cylinders with accumulator assist to provide constant rate steering.
Emergency Power Steering provided by Accumulators

STANDARD DUMP BODY*

Capacity:

Struck	101 yds ³	77 m ³
Heaped @ 2:1 (SAE)	145 yds ³	111 m ³
Width (Inside)	22 ft. 6 in. (6.85 m)		
Depth	6 ft. 10 in. (2.08 m)		
Loading Height	18 ft. 5 in. (5.61 m)		
Dumping Angle	45°		

* OPTIONAL Capacity Dump Bodies are available.

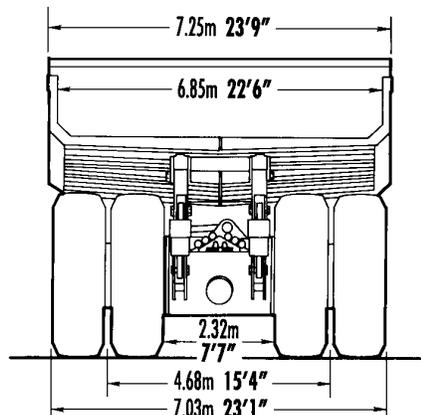
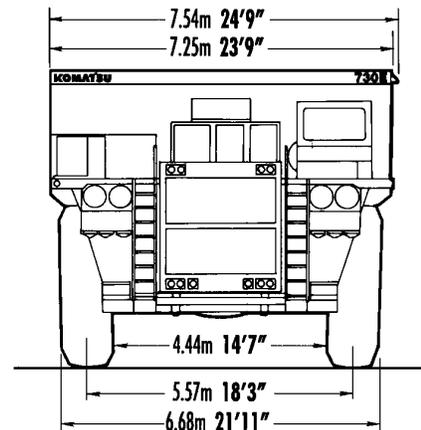
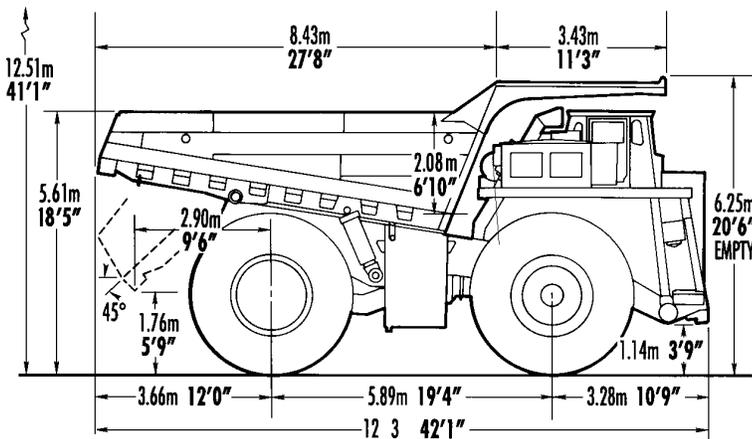
WEIGHT DISTRIBUTION

EMPTY	Pounds	Kilograms
Front Axle	144,594	65 587
Rear Axle	160,457	72 784
Total	305,051	138 371
LOADED		
Front Axle	241,670	109 621
Rear Axle	473,330	214 703
Total	715,000	324 324

Not to exceed 715, 000 lbs. (324 324 kg), including options, fuel, and payload. Weights in excess of this amount require Komatsu / G.E. approval.

TIRES

Radial Tires (standard)	37.00 R57
Rock Service, Deep Tread	Tubeless
Rims	(patented Phase II New Generation™ rims)
Tires and Rims	Interchangeable



All dimensions are with 77/111m³ 101/145 cu. yd. body.
 Vertical dimensions are for standard empty vehicle
 – subtract 150mm/5.9” for vehicle loaded to max. GVW.
 Minimum ground clearance (at max. GVW) 0.72m 2'4”

BODIES	Struck		2:1 Heap		Loading Height		Additional Weight	
	M ³	Cu. Yds.	M ³	Cu. Yds.	M	Feet	Kg	Lbs.
Standard	77	101	111	145	5.61	18'5"	–	–
Std/Optional	96	125	125	163	6.00	19'8"	+1112	+2452
Hi-density*	48	63	86	113	5.04	16'6"	+2400	+5291
H.D. Optional*	60	78	96	126	5.26	17'3"	+3030	+6680
Coal**	176	230	209	273	7.16	23'6"	+2540	+5600

* Floor – 1” (25mm); Front 0.625” (16mm); Sides 0.50” (12mm)
 ** Coal = 3:1 heap capacity - tailgate not included.

A020028

GENERAL SAFETY

This safety section also contains precautions for optional equipment and attachments.



Read and follow all safety precautions. Serious injury or death may result, if all safety precautions are not followed.

SAFETY RULES

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

SAFETY FEATURES

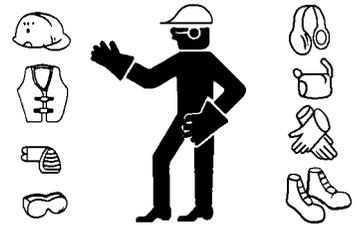
- Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged. (Refer to "Walk-Around Inspection, Operating Instructions", later in this section.)
- Learn the proper use of safety features such as safety locks, safety pins, and seat belts, and use these safety 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.
-

UNAUTHORIZED MODIFICATION

- Any modification made without authorization from Komatsu can create hazards.
- Before making a modification, consult your Komatsu distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

CLOTHING AND PERSONAL PROTECTIVE 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, do not wear oily clothes because they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask or gloves when operating or maintaining the machine. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials—this is so particularly when driving pins with a hammer and when cleaning the air cleaner element with compressed air. Check also that there is no one near the machine.



A0055010

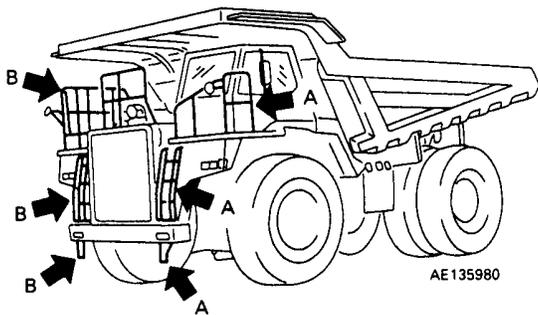
STANDING UP FROM THE SEAT

- To prevent any accident occurring if you should touch any control lever that is not locked, always carry out the following before standing up from the operator's seat.
- Place the shift control lever at neutral (N) and set the parking lever to the PARKING position.
- Lower the dump body, set the dump lever to the HOLD position, then apply the lock.
- Stop the engine. When leaving the machine, always lock everything. Always remember to take the key with you. If the machine should suddenly move or move in an unexpected way, this may result in serious bodily injury or death.

MOUNTING AND DISMOUNTING

- NEVER jump on or off the machine. NEVER get on or off a moving machine.
- When getting on or off the machine, face the machine and use the handhold and steps.
- Never hold any control levers when getting on or off the machine.

- Always maintain three-point contact with the handholds and steps to ensure that you support yourself.
- When bringing tools to 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 handholds or steps, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Use the handrails and steps marked by arrows in the diagram below when getting on or off the machine.



A: For use when getting on or off the machine from the left door.
 B: For use when getting on or off the machine from the engine hood or right door.

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 flame away from flammable fluids.
- Stop the engine and do not smoke when refueling.



- Tighten all fuel and oil tank caps securely.
- Refueling and oiling should be made in well ventilated areas.

- Keep oil and fuel in its specified place and do not allow unauthorized persons to enter.



PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURES

- Immediately after operations, the engine cooling water, engine oil, and hydraulic oil are at high temperature and are under pressure. If the cap is removed or the oil or water is drained or the filters are replaced, there is danger of serious burns. Always wait for the temperature to go down, and carry out the operation according to the specified procedure.
 
- To prevent hot water from spurting out:
 - 1) Stop the engine.
 - 2) Wait for the water temperature to go down.
 - 3) Turn the cap slowly to release the pressure before removing the cap.
- To prevent hot oil from spurting out:
 - 1) Stop the engine.
 - 2) Wait for the oil temperature to go down.
 - 3) Turn the cap slowly to release the pressure before removing the cap.

ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be **HAZARDOUS** to your health if it is inhaled.

If you handle materials containing asbestos fibers, follow these guidelines as given below:



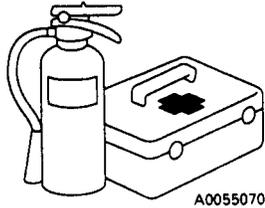
- NEVER use compressed air for cleaning.
- Use water for cleaning to keep down the dust.
- Operate the machine with the wind to your back, whenever possible.
- Use an approved respirator if necessary.

PREVENTION OF INJURY BY WORK EQUIPMENT

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

FIRE EXTINGUISHER AND FIRST AID KIT

- Be sure fire extinguishers have been provided and know how to use them.
- Provide a first aid kit at the storage point.
- Know what to do in the event of a fire.
- Be sure you know the phone numbers of persons you should contact in case of an emergency.



PRECAUTIONS WHEN USING ROPS

- If ROPS is installed, the ROPS must never be removed when operating the machine.
- The ROPS is installed to protect the operator if the machine should roll over. It is designed not only to support the load if the machine should roll over, but also to absorb the impact energy.
- The Komatsu ROPS fulfills all of the regulations and standards for all countries, but if it is rebuilt without authorization or is damaged when the machine rolls over, the strength will drop and it will not be able to fulfill its function properly. It can only display its performance if it is repaired or modified in the specified way.
- When modifying or repairing the ROPS, always contact your Komatsu distributor.
- Even if the ROPS is installed, it cannot show its full effect if the operator does not fasten the seat belt properly. Always fasten the seat belt when operating.

PRECAUTIONS FOR ATTACHMENTS

- When installing and using an optional attachment, 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 or your Komatsu distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the machine.
- Any injuries, accidents, and product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu.

PRECAUTIONS DURING OPERATION

BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting the engine, thoroughly check the area for any unusual conditions that could be dangerous.
- Examine the road surface in the jobsite and determine the best and safest method of operation.
- Choose an area where the ground is as horizontal and firm as possible before carrying out the operation.
- If you need to operate on a road, protect pedestrians and cars by designating a person for worksite traffic duty or by installing fences around the worksite.
- Check the river bed condition, and depth and flow of water before crossing shallow parts of river. NEVER be in water which is in excess of the permissible water depth.
- The operator must check personally the work position, roads to be used, and existence of obstacles before starting operations.
- Always determine the travel roads in the worksite and maintain them so that it is always safe for the machines to travel.

FIRE PREVENTION

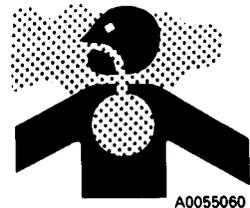
- Thoroughly remove wood chips, leaves, paper and other flammable things accumulated in the engine compartment. They could cause a fire.  A0055020
- Check fuel, lubrication, and hydraulic systems for leaks. Have any leaks repaired. Wipe up any excess oil, fuel or other flammable fluids.
- Be sure a fire extinguisher is present and working.
- Do not operate the machine near any flame.

IN OPERATOR'S CAB

- Do not leave tools or spare parts lying around in the operator's compartment. They may damage or break the control levers or switches. Always put them in the tool box on the right side of the machine.
- Keep the cab floor, controls, steps and handrails free of oil, grease, snow, and excess dirt.
- Check the seat belt, buckle and hardware for damage or wear. Replace any worn or damaged parts. Always use seat belts when operating your machine.

VENTILATION FOR ENCLOSED AREAS

- If it is necessary to start the engine within an enclosed area, provide adequate ventilation. Exhaust fumes from the engine can KILL.



KEEP MIRRORS, WINDOWS, AND LIGHTS CLEAN

- Remove any dirt from the surface of the windows or lights to ensure good visibility.
- Adjust the rear view mirror to a position where the operator can see best from the operator's seat, and keep the surface of the mirror clean. If any glass should break, replace it with a new part.
- Check that the machine is equipped with the head lamps and working lamps needed for the operating conditions. Check that all the lamps light up properly.

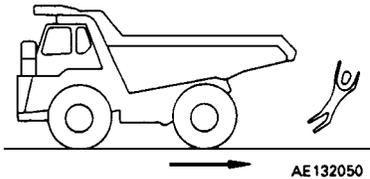
OPERATING MACHINE

WHEN STARTING ENGINE

- Walk around your machine again just before mounting it, checking for people and objects that might be in the way.
- NEVER start the engine if a warning tag has been attached to the control.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.
- Do not allow any person other than the operator in the operator's compartment or any other place on the machine.
- For machines equipped with a back-up alarm buzzer, check that the alarm buzzer works properly.

CHECK WHEN TRAVELING IN REVERSE

- Before operating the machine or work equipment, do as follows:
- Sound the horn to warn people in the area.
- Check that there is no one near the machine. Be particularly careful to check behind the machine.
- If necessary, designate a person to check the safety. This is particularly necessary when traveling in reverse.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Do not allow any one to enter the line of travel of the machine. This rule must be strictly observed even on machines equipped with a back-up alarm or rear view mirror.



TRAVELING

- When traveling on rough ground, travel at low speed. When changing direction, avoid turning suddenly.
- Lower the dump body and set the dump lever to the FLOAT position when traveling.
- If the engine should stop when the machine is traveling, the steering wheel will not work, and it will be dangerous to drive the machine. Apply the brakes immediately and stop the machine.

TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping.
- Do not change direction on slopes. To ensure safety, go down to level ground before turning.
- Do not travel up and down on grass, fallen leaves, or wet steel plates. These materials may make the machine slip on even the slightest slope. Take all possible steps to avoid traveling sideways, and always keep the travel speed low.
- When traveling downhill, use the retarder brake to reduce speed. Do not turn the steering wheel suddenly. Do not use the foot brake except in an emergency.
- If the engine should stop on a slope, apply the brakes fully and apply the parking brake, also, to stop the machine.

ENSURE GOOD VISIBILITY

- When working in dark places, install working lamps and head lamps, and set up lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, or rain, and wait for the weather to improve to a condition that allows the operation to be carried out safely.

OPERATE CAREFULLY ON SNOW

- When working on snowy or icy roads, there is danger that the machine may slip to the side on even the slightest slope, so always travel slowly and avoid sudden starting, turning, or stopping.
- Be extremely careful when carrying out snow-clearing operations. The road shoulder and other objects are buried in the snow and cannot be seen.
- When traveling on snow-covered roads, always install tire chains.

AVOID DAMAGE TO DUMP BODY

- When working in tunnels, on bridges, under electric cables, or when entering a parking place or any other place where there are height limits, always drive extremely carefully and lower the dump body completely before driving the machine.

WHEN DUMPING

- Before starting the dumping operation, check that there is no person or object behind the machine.
- Stop the machine in the correct position, and check again that there is no person or object behind the machine. Give the determined signal, then slowly operate the dump body. If necessary, use blocks for the wheels or position a flagman.
- When carrying out dumping operations on slopes, the machine stability will become poor and there is danger that it may tip over. Always carry out such operations extremely carefully.
- Do not travel with the dump body raised.

WORKING ON LOOSE GROUND

- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse, your machine could fall or tip over and result in serious injury or death. Remember that the soil after heavy rain or blasting is weakened in these areas.
- Earth laid on the ground and the soil near ditches are loose. They can collapse under the weight or vibration of your machine.
- When operating in places where there is danger of falling rocks or danger of the machine turning over, always install ROPS and a seat belt.

WHEN LOADING

- Check that the surrounding area is safe, stop the machine in the correct loading position, then load the body uniformly.
- Do not leave the operator's seat during the loading operation.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

- Going close to high-voltage cables can cause electric shock. Always maintain the safe distance given below between the machine and the electric cable.

Voltage	Minimum Safety Distance	
6.6 kV	3 m	10 ft
33.0 kV	4 m	14 ft
66.0 kV	5 m	17 ft
154.0 kV	8 m	27 ft
275.0 kV	10 m	33 ft

- The following actions are effective in preventing accidents:
 - 1) Wear shoes with rubber or leather soles.
 - 2) Use a signalman to give warning if the machine approaches too close to the electric cable.
- If the work equipment should touch the electric cable, the operator should not leave the operator's compartment.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.
- Check with the electricity company about the voltage of the cables before starting operations.

PARKING THE MACHINE

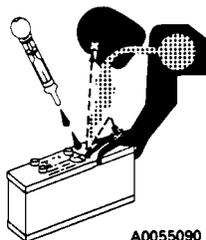
- Choose a horizontal road surface to park the machine. If the machine has to be parked on a slope, always put blocks under all the wheels to prevent the machine from moving.
- When parking on public roads, provide fences and signs, such as flags or lights, on the machine to warn pedestrians and other vehicles. Be sure that the machine, flags, or lights do not obstruct the traffic.
- Before leaving the machine, lower the dump body fully, set the parking lever to the PARKING position, stop the engine, then lock everything. Always take the key with you.

BATTERY

BATTERY HAZARD PREVENTION

- Battery electrolyte contains sulfuric acid and can quickly burn the skin and eat holes in clothing. If you spill acid on yourself, immediately flush the area with water.

- Battery acid could cause blindness if splashed into the eyes. If acid gets into the eyes, flush them immediately with large quantities of water and see a doctor at once.



- If you accidentally drink acid, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention center immediately.

- When working with batteries ALWAYS wear safety glasses or goggles.

- Batteries generate hydrogen gas. Hydrogen gas is very EXPLOSIVE, and is easily ignited with a small spark of flame.



- Before working with batteries, stop the engine and turn the starting switch to the OFF position.

- Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.

- When removing or installing, check which is the positive (+) terminal and negative (-) terminal.

- Tighten the battery cap securely.

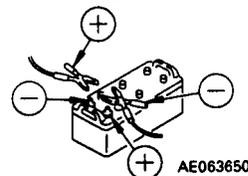
- Tighten the battery terminals securely. Loosened terminals can generate sparks and lead to an explosion.



STARTING WITH BOOSTER CABLES

- ALWAYS wear safety glasses or goggles when starting the machine with booster cables.
- When starting from another machine, do not allow the two machines to touch.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the ground or negative (-) cable first when removing them.

INCORRECT



- If any tool touches between the positive (+) terminal and the chassis, it will cause sparks. This is dangerous, so be sure to work carefully.

- Connect the batteries in parallel: positive to positive and negative to negative.

- When connecting the ground cable to the frame of the machine to be started, be sure to connect it as far as possible from the battery.



TOWING

WHEN TOWING, FIX WIRE TO HOOK

- Towing in the wrong way may lead to serious personal injury or damage.
- When using another machine to tow this machine, use a wire rope with ample strength for the weight of this machine.
- Never tow a machine on a slope.
- Do not use any towing rope that has kinks or is twisted.
- Do not stand astride the towing cable or wire rope.
- When connecting a machine that is to be towed, do not let any one come between the towing machine and the machine that is being towed.
- Set the coupling of the machine being towed in a straight line with the towing portion of the machine, and secure it in position. (For towing method, see "Operating Instructions" later in this section.)