

Shop Manual

DG715



210M

DUMP TRUCK

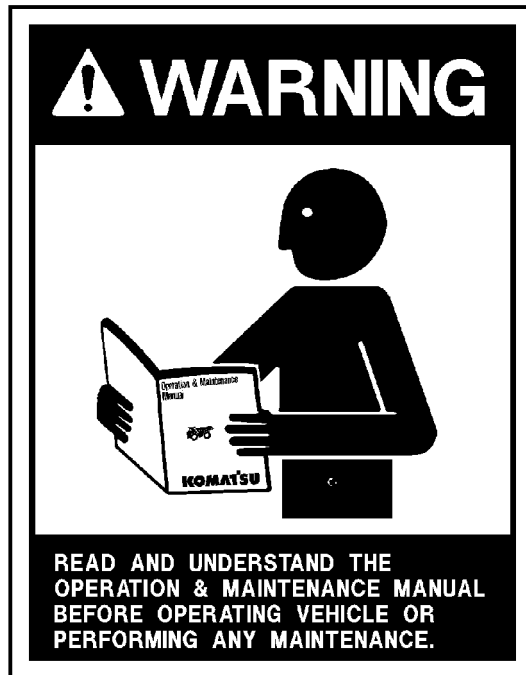
SERIAL SUFFIX

BFA40DA THRU **EP**
24501 THRU **24647**

KOMATSU

⚠ WARNING

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.



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

210M



KOMATSU

FOREWORD

This Service 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 HAULPAK[®] Model designation consists of three numbers and one letter (i.e. 210M). 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.

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210M HAULPAK[®] TRUCK

SECTION A

GENERAL INFORMATION

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NOTES

COMPONENT DESCRIPTION AND SPECIFICATIONS

ENGINE

The 210M HAULPAK Truck is powered by a Cummins QSK-19 diesel engine. It is capable of speeds up to 39.7 MPH (63.9 km/h).

TRANSMISSION

The diesel engine drives a remote-mounted Allison M6600 transmission incorporating a TC683 torque converter. The transmission has six "Forward" speeds and two "Reverse" speeds and uses Commercial Electronic Control (CEC) for complete automatic shift sequencing.

The operator may select "R1" or "R2" for Reverse, "N" for Neutral, or any one of the six Forward driving ranges by using the Transmission Range Selector. Each position (R2, R1, N, D, 5, 4, 3, 2, 1) is selected by releasing a range locking mechanism on the lever and choosing the desired range. "D" will permit completely automatic up and down shifts through all six ranges. "5" will limit upshifts to 5th range only. "4" will limit upshifts to 4th range only. "3" will limit upshifts to 3rd range only. "2" will limit upshifts to 2nd range only. "1" is a first range hold position and no upshifts are permitted.

"R1" or "R2" REVERSE position is used to back the truck. "R1" position should be used for normal reverse operation. This range selection utilizes the standard 5.12:1 gear reduction ratio. "R2" position may be used for job operations that would benefit from a higher speed reverse operation. This range selection utilizes a 3.43:1 gear reduction ratio.

FINAL DRIVE

The Planetary Final Drive has full floating axle shafts and a plug-in differential carrier assembly.

SERVICE BRAKE SYSTEM

The service brakes are controlled by an all hydraulic actuation system. Depressing the service brake pedal actuates front dry disc brakes and rear wet disc brakes. Automatic Emergency Braking is provided if system pressure falls below a preset value. All functioning wheel brakes will be automatically applied by accumulators.

DYNAMIC RETARDING

Dynamic retarding is actuated by depressing the operator's retarder pedal which applies oil-cooled, rear mounted, wet disc brakes only; *the front brakes are not applied.*

Application of the retarder pedal may be fully modulated and should be used to slow the truck during normal truck operation, to control speed coming down a grade or to make non-emergency stops. Use of the retarder pedal saves wear on the front brakes and provides better steering control.

POWER STEERING

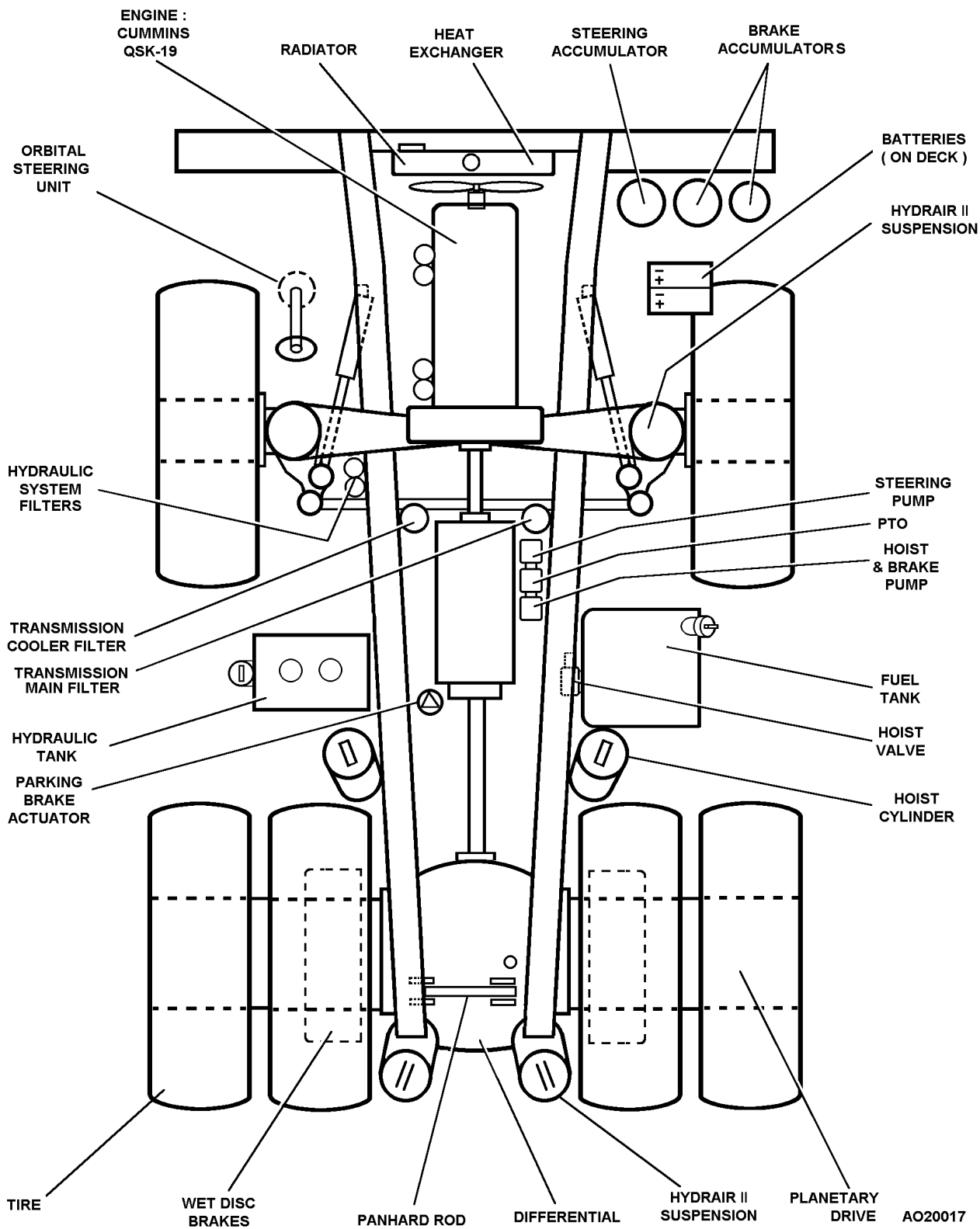
The HAULPAK Truck is equipped with an orbital power steering system mounted under the cab floor with noise and vibration isolators. An accumulator automatically provides emergency power to safely steer the truck while stopping.

INSTRUMENTS

The cab instrument panel displays for the operator all switches and gauges which are necessary to safely control the truck and monitor the truck's operating systems.

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



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MODEL 210M HAULPAK MAJOR COMPONENTS

The SPECIFICATIONS listed on these pages cover standard production. When optional equipment is selected, some of these specifications and/or capacities may change.

ENGINE

Cummins QSK-19
 Number of Cylinders 6
 Operating Cycle 4-Stroke
 Rated Brake HP (SAE) ~~675 HP~~ (504kW) @ 2100 RPM
 Flywheel HP (SAE) . **641 HP** (478kW) @ 2100 RPM
 Maximum Torque:
 **2275 ft. lbs.** (3085 N.m) @ 1400 RPM

TRANSMISSION ALLISON M-6600 w/CEC

Torque Converter TC683
 6 Speeds FORWARD 2 REVERSE

SUSPENSION HYDRAIR® II

Stroke (Front & Rear) **10.88 in.** (276 mm)

FINAL DRIVE

Ratios:
 Bevel Set (differential) 3.85:1
 Planetary 5.70:1
 Total Reduction 21.93:1
 Maximum Speed **39.7 MPH** (63.9 km/h)

TIRES (Standard) 24.00-35, 36 PR(E-3)

Rating Ton-MPH (m/ton-km/h) **180** (262.8)

24 VDC ELECTRIC SYSTEM

Batteries Two 12 Volt Batteries in Series
 Capacity 200 Ampere-Hour
 Alternator 24 Volt, 75 Amperes Output
 Starter One 24-Volt
 Lighting 24 Volt-DC

SERVICE CAPACITIES U.S. Gallons Liters

Engine Lube Oil:
 Cummins **16** 60.6
 Cooling System **56** 212.0
 Fuel Tank **154** 583.7
 Hydraulic System (incl. tank) **144** 545.0
 Hydraulic Tank **95** 359.6
 Transmission **20** 75.6
 Final Drive **56** 212.2
 Front Spindle **1** 3.8

HOIST SYSTEM

Tandem Pump Capacity:
 Shaft End **94 gpm** (355 l/min.) @ 2100 RPM
 Cover End **80 gpm** (303 l/min.) @ 2100 RPM
 Relief Valve Pressure Setting **2750 psi** (18961 kPa)
 Hoist Cylinders 2 - Stage Hydraulic Cylinders
 Filtration Full-Flow, Remote-Mounted Filter
 Return Full Flow, 12 Micron - Absolute

SERVICE BRAKES

Actuation All Hydraulic
 Type:
 (Front) Single Dry Disc with 2 Caliper Assy./Wheel
 Total Braking Surface **408 in.²** (2 632 cm²)
 (Rear) Dual Wet Disc Brake Assemblies
 Total Braking Surface **9020 in.²** (58 193 cm²)

STEERING

Turning Circle **69 ft.** (21.0 m)
 Pump Capacity **22.7 gpm** (85.9 lpm)
 System Pressure **2750 psi** (19.0 MPa)

DUMP BODY CAPACITIES

PAYLOAD (Rated) 55 Ton (49.9 mt)

Capacity:
 Struck **31.1 cu. yds.** (23.8 m³)
 Heaped @ 2:1 (SAE) **44.0 cu. yds.** (33.7 m³)

BODY

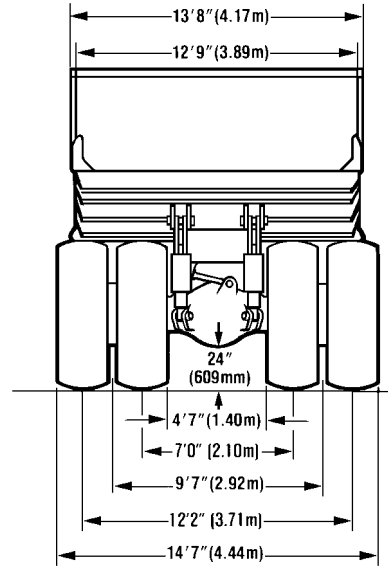
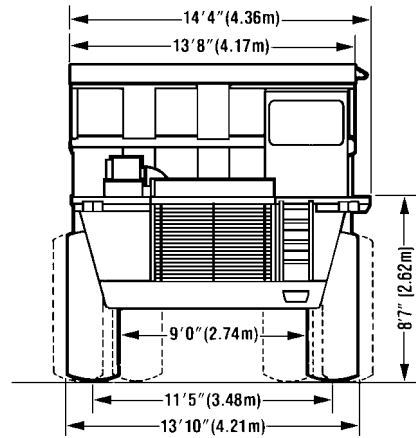
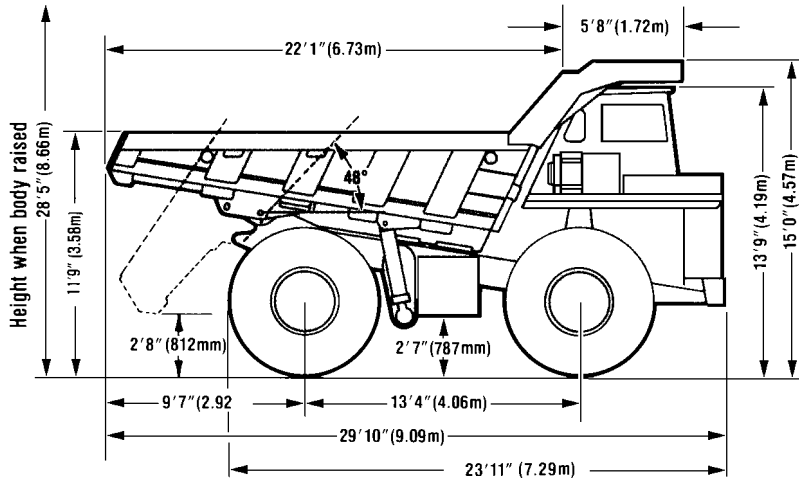
Material [Yield Strength] Thickness
 Floor [**150,000 psi** (1039 mPa)] Steel **0.75 in.** (19 mm)
 Front [**100,000 psi** (690 mPa)] Steel **0.50 in.** (13 mm)
 Sides [**100,000 psi** (690 mPa)] Steel **0.38 in.** (10 mm)

WEIGHT DISTRIBUTION

EMPTY - STANDARD Pounds Kilograms
 Front Axle **44,640** 20 249
 Rear Axle **46,460** 21 074
 Total **91,100** 41 323
LOADED Pounds Kilograms
 Front Axle **72,500** 32 886
 Rear Axle **137,500** 62 370
 Total **210,000** 95 256

MAXIMUM ALLOWABLE GVW 210,000 95 256

OVERALL TRUCK DIMENSIONS



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GENERAL SAFETY

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



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

SAFETY RULES

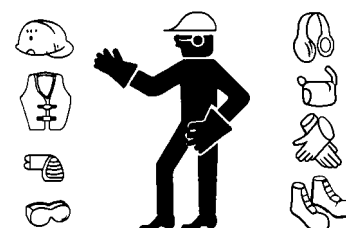
- ONLY trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- When working with another operator or a person on worksite traffic duty, be sure all personnel understand all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

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.



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UNAUTHORIZED MODIFICATION

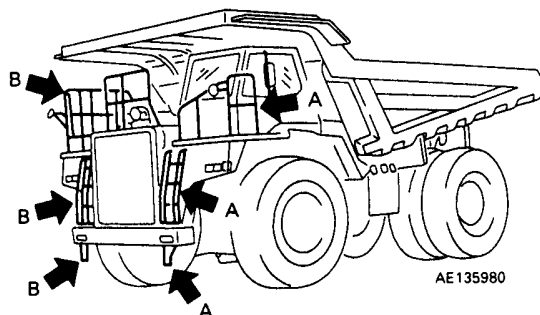
- Any modification made without authorization from Komatsu can create hazards.
- Before making a modification, consult your Komatsu distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

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

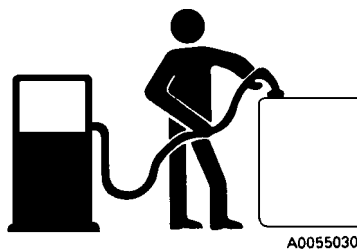
- NEVER jump on or off the machine. NEVER get on or off a moving machine.
- When getting on or off the machine, face the machine and use the handhold and steps.
- Never hold any control levers when getting on or off the machine.
- Always maintain three-point contact with the handholds and steps to ensure 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

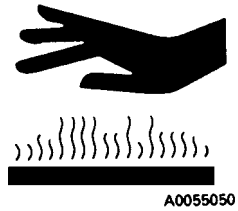
Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly **FLAMMABLE** and can be **HAZARDOUS**.

- 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 the determined 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.

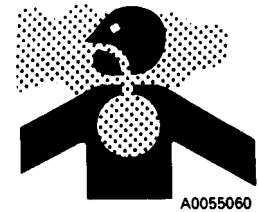


ASBESTOS DUST HAZARD PREVENTION

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.

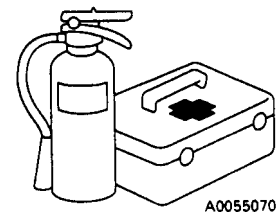


PREVENTION OF INJURY BY WORK EQUIPMENT

- 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.
- 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.

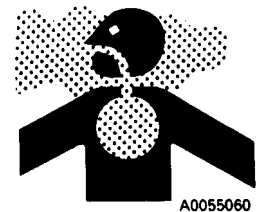


IN OPERATOR'S CAB

- 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.



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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.