CEAM010800

Operation & Maintenance Manual

WB140PS-2N
WB150PS-2N

BACKHOE LOADER

SERIAL NUMBERS

WB140PS-2N	A40001	and UP
WB150PS-2N	A70001	and UP

March 2003

Published in USA
Komatsu America Corp.

PRODUCT PUBLICATIONS INFORMATION

Various product Parts and Service Publications are available to all **KOMATSU** construction equipment owners, including operation and maintenance manuals, parts books and service manuals.

Special publications, such as service tool, air conditioning and turbocharger service manuals are also available as well as selected Operation and Service manuals in foreign languages.

The Publications listed below are available for this particular machine(s).

DESCRIPTION	FORM NUMBER
PARTS BOOK - PAPER:	
Chassis and Engine (WB140PS-2N)	BEPB021400
Chassis and Engine (WB150PS-2N)	BEPB021500
OPERATION AND MAINTENANCE MANUAL:	
Chassis and Engine	CEAM010800
SHOP MANUAL	
Chassis	CEBM011100
Engine	WEBM4D9801
SAFETY MANUAL	
Machine specific	BL10-3

Parts and Service Publications can *only* be acquired by authorized KOMATSU distributors using the Komatsu America International Company Parts Inventory Processing System (PIPS) or the Extranet Literature Ordering System.

If the PIPS system is not available at the distributor location, then the following Requisition for Technical Service Publications and Service Forms can be used. Form KDC91E is shown on the reverse side of this page.

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QTY.	PUBLICATION FORM NO.	PARTS BOOK ⬇ P-Paper M-Microfiche		PUBLICATION DESCRIPTION	MODEL NUMBER	SERIAL NUMBER

CURRENT PRICES WILL BE CHARGED

EMISSION CONTROL WARRANTY

EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)

1. Products Warranted

Komatsu America International Company, Komatsu Mining Systems Inc. and Komatsu Utility Corporation (collectively "Komatsu") produce and/or market products under brand names of Komatsu, Dresser, Dressta, Haulpak and Galion. This emissions warranty applies to new engines bearing the Komatsu name installed in these products and used in Canada in machines designed for industrial off-highway use. This warranty applies only to these engines produced on or after January 1, 2000. This warranty will be administered by Komatsu distribution in Canada.

2. Coverage

Komatsu warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform, at the time of sale by Komatsu, with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within five years or 3,000 hours of operation, whichever occurs first, as measured from the date of delivery of the engine to the ultimate purchaser.

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Failures, other than those resulting from defects in materials or workmanship, are not covered by this warranty. Komatsu is not responsible for failures or damage resulting from what Komatsu determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; over fueling; over speeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the engine. Komatsu is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel. Komatsu is not responsible for non-engine repairs, "downtime" expense, related damage, fines, all business costs or other losses resulting from a warrantable failure.

KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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1. Produits garantis:

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2. Couverture:

Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de défauts de construction ou de matériaux qui auraient pour effet de contrevenir à ces réglementations en dedans de 5 ans ou 3000 heures d'opération, mesuré à partir de la date de livraison du moteur au client ultime.

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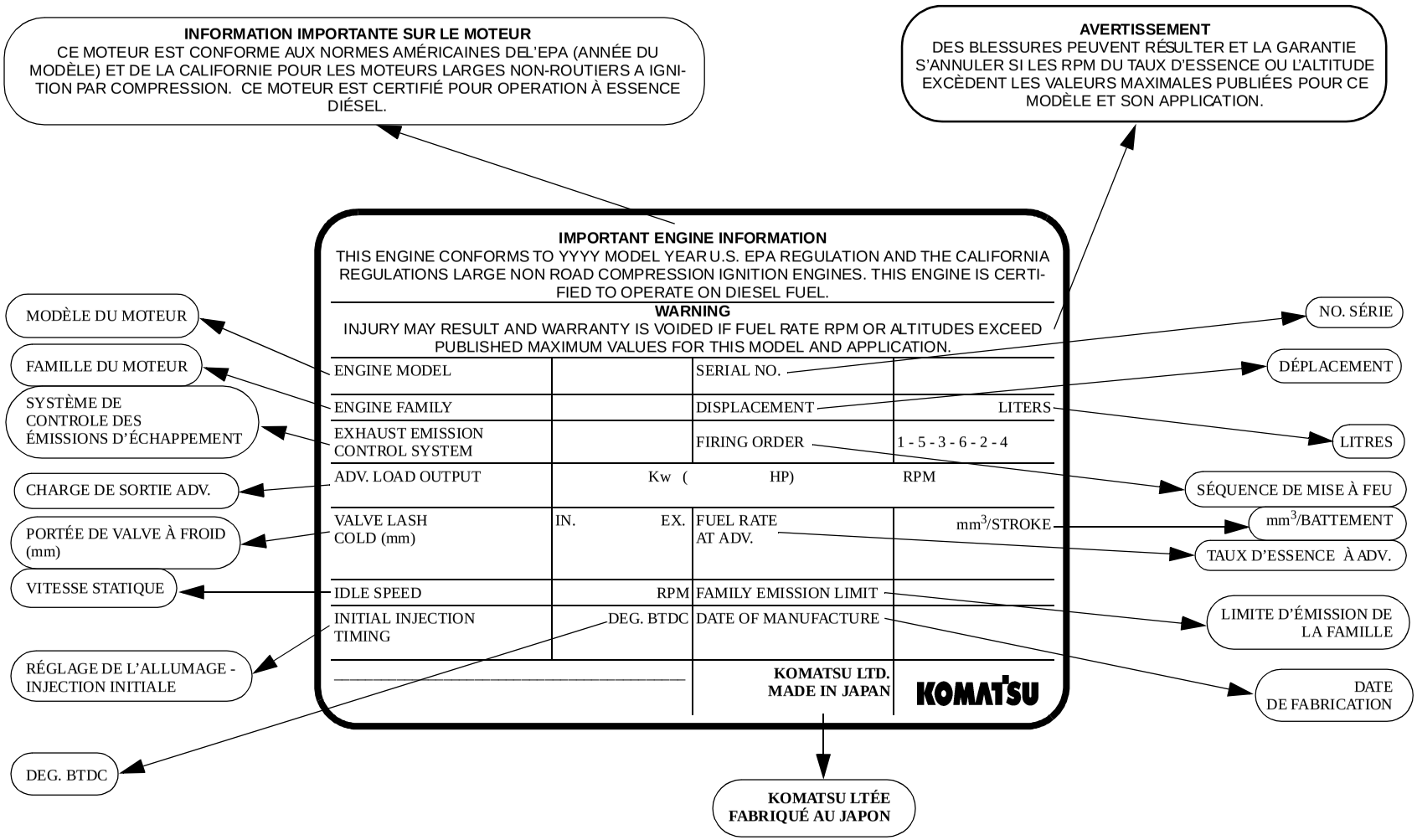


ENGINE DATAPLATE - ENGLISH / FRENCH

INTRODUCTION

FOREWORD

This manual describes procedures for operation, handling, lubrication, maintenance, checking, and adjustment. It will help the operator and maintenance personnel achieve peak performance through effective, economical and safe machine operation and maintenance.

Keep this manual handy and have all personnel read it periodically. If this manual is lost, damaged or becomes dirty and cannot be read, request a replacement manual from your local distributor.

If you sell the machine, be sure to give this manual to the new owner.

Continuing improvements in the design of this machine can lead to changes, which may not be reflected in this manual. Consult your local Komatsu distributor or for the latest available information on your machine or for questions regarding information in this manual.

This manual may contain attachments and optional equipment that are not available in your area. Consult your local Komatsu distributor or for those items that you may require.

⚠ WARNING

Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.

- **Operators and maintenance personnel must read this manual thoroughly before operating or maintaining this machine.**
- **This manual should be kept near or with the machine for reference and periodically reviewed by all personnel who operate it.**
- **Some actions involved in operation and maintenance can cause a serious accident, if they are not performed in the manner described in this manual.**
- **The procedures and precautions given in this manual apply only to the intended uses of this machine. If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses or actions as described in this manual.**
- **KOMATSU delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety features and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult your local distributor or KOMATSU before operating the machine.**
- **The safety description is given in SAFETY INFORMATION and in the SAFETY section 1 ★**

SAFETY INFORMATION

Most accidents are caused by failure to follow fundamental safety rules for the operation and maintenance of the machine. To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the machine before performing maintenance and machine operations.

To identify safety messages in this manual and on machine product graphics, the following signal words are used:

DANGER! - This word is used on safety messages and product graphics where there is a high probability of serious injury or death if the hazard is not avoided. These safety messages and product graphics usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may result in serious damage to the machine, injury or even death.

WARNING! - This word is used on safety messages and product graphics where there is a potentially dangerous situation, which could result in serious injury or possibly death if the hazard is not avoided. These safety messages and product graphics usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may result in serious damage to the machine or possible injury.

CAUTION! - This word is used on safety messages and product graphics for hazards, which could result in minor or moderate injury if the hazard is not avoided. These safety messages and product graphics might also use this word for hazards where the only result could be damage to the machine.

Remark

This word is used for precautions that must be taken to avoid actions, which could shorten the life or damage the machine.

Safety precautions are described in **SAFETY** section **1★**

KOMATSU cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety message in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine or causing injury. If you are unsure about the safety of some procedures, contact your local **KOMATSU** Distributor.

APPROVED AND NON-APPROVED USES

The Komatsu BACKHOE LOADERS described in this manual have been designed and constructed to be used mainly for the following functions, any non-approved used may void the warranty, damage the machine or possibly injure the operator.

APPROVED

- LOADING, SCRAPING OR GRADING OPERATIONS.
- EXCAVATING.

Installation of optional equipment can also be used in the following applications, use only KOMATSU approved equipment.

- HANDLING OF MATERIALS (4 IN 1 BUCKET - PALLET FORKS).
- SNOW PLOWING (ANGLE DOZER BLADE - SNOWPLOW).
- DEMOLITION (HAND HAMMER AND HAMMER ON BACKHOE).
- DITCH CLEANING AND DIGGING (SPECIAL BUCKETS).

NON-APPROVED

Because it is impossible to predict all the possible improper uses, using the machine for any application other than those approved above, contact your authorized Komatsu dealer before performing the work operations. Below are just some of the unauthorized uses of the machine:

- LIFTING OR TRANSPORTING PERSONNEL IN ANY MANNER.
- TRANSPORTING FLAMMABLE LIQUIDS.
- LIFTING, MOVING OR TRANSPORTING OTHER MACHINES WITH THE LOADER OR BACKHOE.
- TOWING OTHER EQUIPMENT WITH THE TRACTOR OR WORK EQUIPMENT.
- USING THE BACKHOE UNIT TO MOVE OR REPOSITION THE MACHINE.
- USING THE BACKHOE OR LOADER AS A HAMMER OR FOR STRIKING OR DRIVING OBJECTS.
- TOWING THE MACHINE AT HIGH SPEEDS.
- TRAVELING AT HIGH SPEEDS.

PRODUCT INFORMATION

Listed are features and machine identification locations. Komatsu backhoe loader and main components are identified by serial numbers stamped on identification plates or decals attached to the machine or component.

MAIN FEATURES

- Simple and easy operation.
- Power-assisted steering with priority hydraulic system.
- Loader control through a single lever ensures combined movements that can be modulated proportionally and continually.
- Wobble stick backhoe controls with two levers ensure combined movements that can be modulated proportionally and continually.
- Complete series of instruments visible from the two operating positions (loader or backhoe).
- Separate engine throttle controls for the two operating positions.
- Foot brake control.
- Easy maintenance with simplified intervals.

BREAK-IN PERIOD

Every new machine is properly adjusted and tested before delivery. Operate a new machine carefully for the first 100 hours to ensure proper break-in of the various components. Subjecting the machine to excessive or severe work loads at the beginning of the machine's life will shorten it. Follow the recommendations for operating a new machine:

- After start-up, let the engine idle ar a low RPM for 5 minutes, to warm it up the machine gradually before beginning actual operation.
- Operate the machine with limited loads.
- Avoid abrupt starts, accelerations, sudden decelerations, abrupt reversals or sudden stops.
- After the first 250 hours, perform the following maintenance, in addition to normal maintenance performed at 250 hours:
  A. Change the hydraulic transmission oil and filter.
  B. Change the differential unit oil (front and rear axle).
  C. Change the oil in the final reduction gears (front and rear axle).
  D. Check and adjust the engine valve clearance.
  E. Change the hydraulic system oil filter.

SYNTHETIC, BIODEGRADABLE OIL

Hydraulic oil Environmental Ester Synthetic (HEES) is a synthetic biodegradable oil. Machines that use HEES, perform the following operations in addition to the standard maintenance operations:

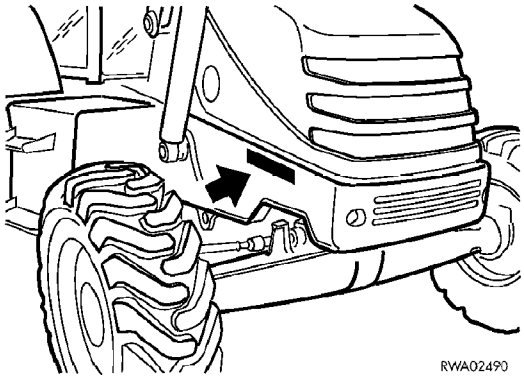
- After the first 50 hours of operation, change the hydraulic system filter.
- After the first 500 hours of operation, change the hydraulic system oil and filter.

PRODUCT IDENTIFICATION

The serial numbers and model numbers on the components are the only numbers that your dealer will need when requiring assistance or ordering replacement parts. record this information in this manual on page 0-9 (Serial Number and dealer information). All directions given below are viewed from the operators position.

MACHINE SERIAL NUMBER

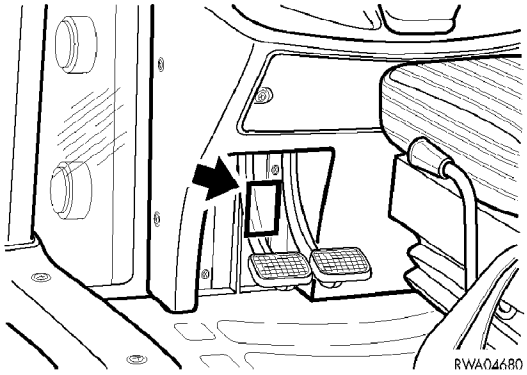
The machine serial number is stamped on the right side of the front part of the main tractor frame.



MACHINE IDENTIFICATION PLATE

The Komatsu backhoe loaders described in this manual are provided with the **CE** mark which certifies that they are in compliance with the **CE** standards.

The identification plate is located inside the operators cab on the left vertical wall of the frame, behind the brake pedals.



MODEL	
SERIAL No.	
MANUFACTURING YEAR	
MASS	
ENGINE POWER MANUFACTURER	

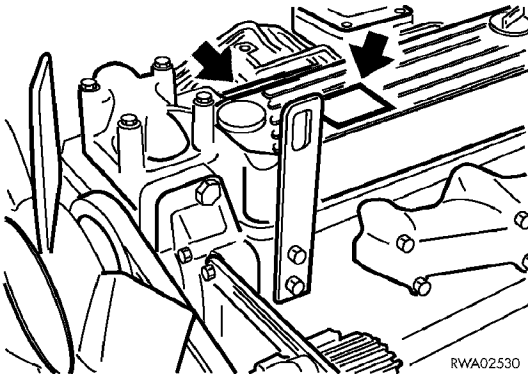
KOMATSU AMERICA INTERNATIONAL CO.

2938-98-1140

ENGINE SERIAL NUMBER AND EMISSION LABEL

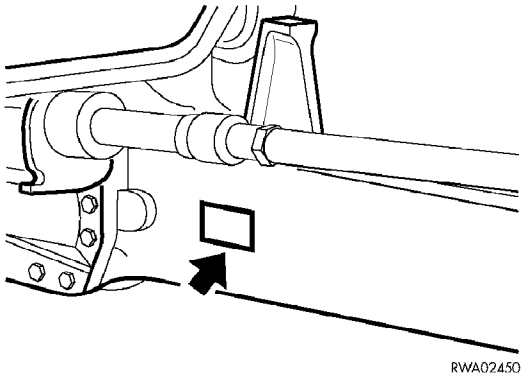
The engine serial number is stamped on a plate located on top of the engine valve cover.

The emission label is located on the right side of the valve cover.



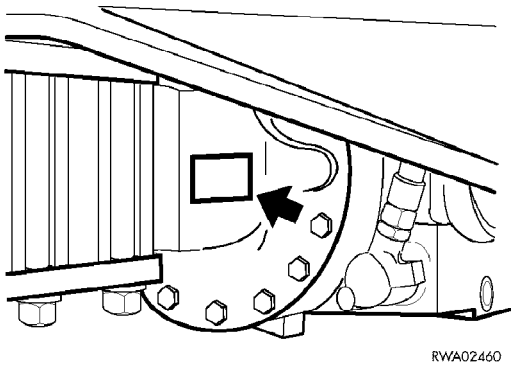
FRONT AXLE SERIAL NUMBER

The serial number for the front axle is stamped on a plate located on the right side of the axle housing.



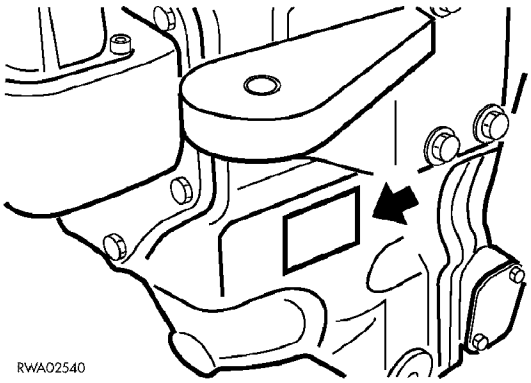
REAR AXLE SERIAL NUMBER

The serial number for the rear axle is stamped on a plate located on the right side of the axle housing.



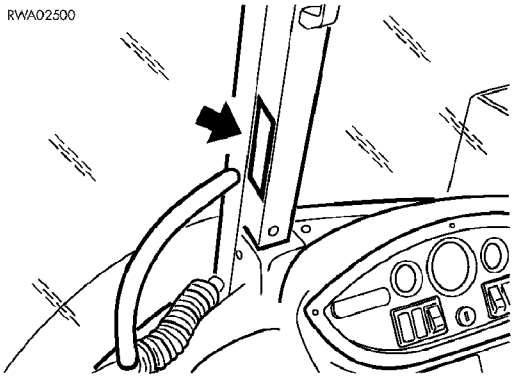
TRANSMISSION SERIAL NUMBER

The serial number for the transmission is stamped on a plate located on the right side of the transmission case.



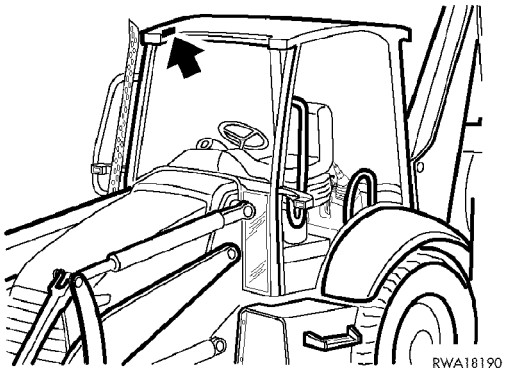
CAB SERIAL NUMBER

The serial number for the cab is stamped on a plate located on the right center pillar.



CANOPY SERIAL NUMBER

The serial number for the canopy is stamped on the plate located on the inside upper right corner.



SERIAL NUMBERS AND DEALER INFORMATION

MODEL: WB140PS-2/WB150PS-2

Machine #	
Engine #	
Front axle #	
Rear axle #	
Transmission #	
Cab or Canopy #	

Dealer:

Address:

Phone #

Contacts:

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SAFETY

WARNING!

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

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

GENERAL SAFETY RULES AND PRECAUTIONS

GENERAL SAFETY RULES

Only trained and authorized personnel shall be allowed to operate and service this machine.

Before operating this machine it is important to study the operator's manual thoroughly and become familiar with all controls and safety decals. Keep this manual with your machine at all times for easy reference.

Safety must always be the operator's most important concern. Never operate a machine that is unsafe or in poor operating condition.

Always perform a preoperational check on your machine before operating it.

If the machine is equipped with a seat belt and rollover protective structure, OSHA law requires the operator remain within the confines of the rollover protective structure. And the seat belt fastened snugly around the waist while operating the machine.

OSHA law states if your equipment is designed for operation by one person, it is for one person only. Never allow other personnel to ride on your machine.

Never leave your machine running and unattended. Always park the machine in a level area, lower any work equipment to the ground, set the parking brake, lock the controls and turn the engine off before exiting the operator's compartment.

Be sure that all personnel are at least 12 m (40 ft.) away from any point on the machine before moving or operating the machine. Never allow anyone to stand near the machine while in operation. The larger the machine, the more restricted your visibility will be.

If pedestrians are in the area proceed slowly and sound the horn. Keep in mind, pedestrians have the right away. And a loaded or smaller machine has the right away over an unloaded machine or larger machine.

Never use your machine for tasks it was not designed for. Damage to the machine or injury to the operator may result.

Follow all safety rules, precautions, and instructions when operating or performing maintenance on the machine.

It is the owner and /or operator's responsibility to replace any safety or warning decals if they are defaced or removed from the machine.

Think before you act. Study the job carefully. Careful operator's and service personnel are the best insurance against accidents.

The operator of this machine must be alert, physically fit, and free from the influences of alcohol, drugs or medications that might affect there eyesight, hearing, or reactions.

When working with another person on a work site, be sure you both understand the hand signals to be used.

When leaving a job site, always lower all work equipment to the ground and then neutralize the work equipment controls. Secure your machine properly to avoid tampering.

Never drive up to anyone standing in your path of travel. Always be sure all personnel are standing to the side when you approach them, and that they acknowledge your approach.

Follow all rules relating to safety as outlined in this manual and by your company. Never get involved in horseplay while working.

SAFETY FEATURES

Be sure all guards and covers are in place especially after servicing the machine.

Have guards or covers repaired immediately, if they are damaged. See “PRECAUTIONS BEFORE STARTING ENGINE” on page 1-9.

Use safety equipment such as safety locks and seat belt properly.

Never remove any safety features. Always keep them in good operating condition.

Always secure the machine in a safe position: See “PARKING THE MACHINE” on page 1-20.

Seat belt: See “INSIDE THE OPERATOR’S COMPARTMENT” on page 1-8.

Improper use of safety features could result in serious bodily injury or death.

Be sure the machine has the correct equipment required by local rules and regulations.

PERSONAL PROTECTIVE EQUIPMENT

If your machine is equipped with safety equipment OSHA law requires this equipment to be used when operating your machine.

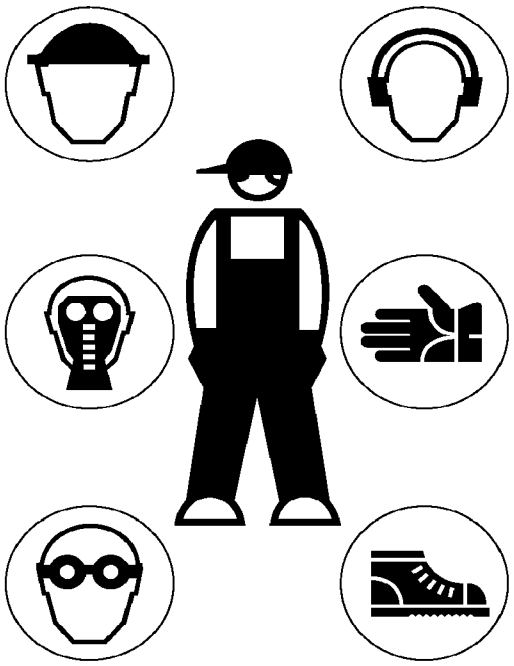
Avoid loose-fitting clothing, jewelry and long hair. These can catch on controls or in moving parts and cause serious injury.

Wear a hard hat, safety glasses, safety shoes, mask, and gloves when operating or maintaining the machine.

Always wear safety goggles, hard hat and heavy gloves, if your job involves driving pins with a hammer or cleaning the air cleaner element with compressed air.

Check to be sure no one is near your work area.

Check to be sure all personal protective equipment are in good condition before using.



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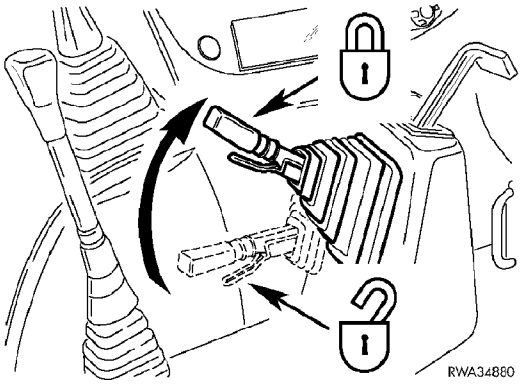
UNAUTHORIZED MODIFICATIONS

Any modification made without written authorization from Komatsu can create a hazards. Komatsu will not be responsible for any injury or damage caused by any unauthorized modifications.

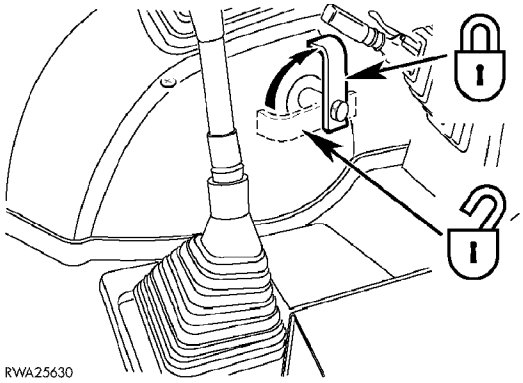
LEAVING OPERATOR'S COMPARTMENT

Below are listed procedures that must be followed when exiting the operator's cab.



1. Park the machine in a level area.
2. Lower all work equipment to the ground.
3. Engage the parking brake.

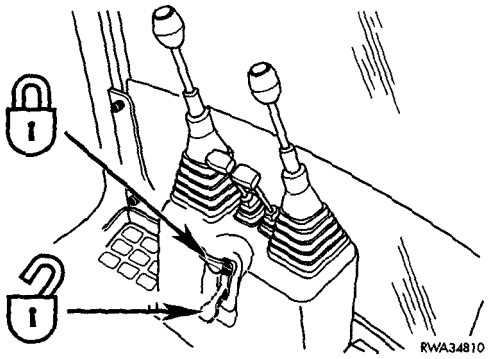
4. Place the loader control safety lock lever in the **LOCKED** position.



5. Place the backhoe safety lock lever in the **LOCKED** position.

6. Remove the ignition key and keep it with you.

7. Use the key to lock and secure all the equipment locks. This action prevents unauthorized personnel from tampering with the machine. You are responsible for securing the machine.



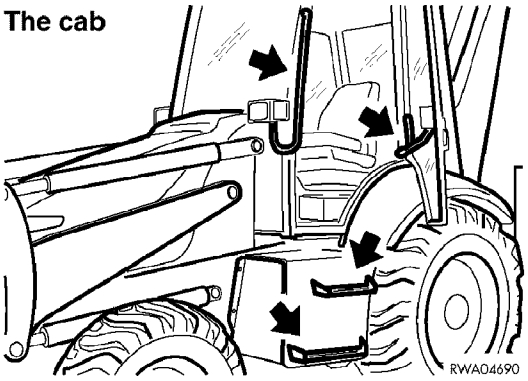
Remark

Never leave your machine running and unattended, even for a moment.

Work equipment posture: See "PARKING THE MACHINE" on page 1-20.
Lock: See "SAFETY LOCK USAGE" on page 1-22.

ENTERING AND EXITING THE MACHINE

The cab



Use all hand holds and step plates on your machine.

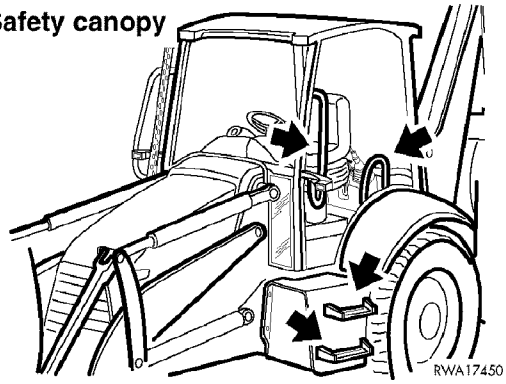
Never jump off or onto the machine.

Before getting on the machine, wipe off any oil, grease, or mud from your shoes, or the machine's rails, steps or platform. Keep these areas clean, and in good condition.

Never get on or leave a moving machine. These actions may lead to serious injury. Always bring the machine to a full stop.

Be sure machine is at a full stop, equipment lowered and parking brake set before entering or exiting machine.

Safety canopy

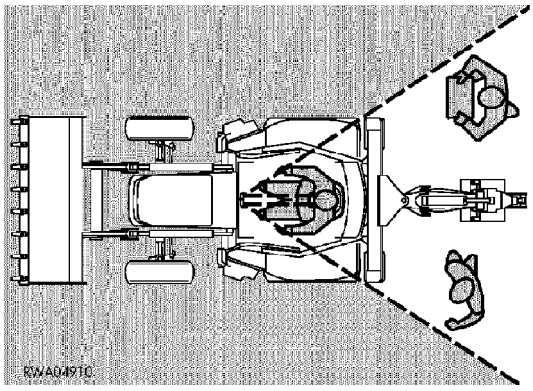


Never hold any control levers or the steering wheel when getting on or off the machine.

When getting on or leaving the machine, always face the machine and maintain a **Three-Point Contact.** It is defined as both feet on the steps and one hand on the handrails. Or, both hands on the handrails and one foot on the steps.

CHECKING THE REAR VIEW MIRROR

Make sure that the rear-view mirror is clean and correctly positioned. The operator should be able to see the rear of the machine, without moving the upper body while driving the machine. If the mirror moves during operation, stop the machine and readjust the mirror before resuming work. If the mirror falls off the machine, stop the machine and make the needed repairs before continuing with work. Check the rear view frequently while working, especially before backing up, to ensure that no person, fixed obstacles, or other machines are in the work area.



FIRE PREVENTION FOR FUEL AND OIL

Fuel and oil are flammable and can be hazardous. Always observe the following:

- Keep any flames away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Refueling or adding oil should be made in well ventilated areas.
- Keep oil and fuel in its proper place.
- Clean up any fluid spills.

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PREVENTING BURNS

Wear gloves and safety goggles when checking any fluid levels: engine oil, hydraulic oil, engine coolant, transmission fluid.
Before checking the engine coolant, engine oil, or hydraulic oil, stop the engine and let the fluids cool down before attempting to check the level. If you don't, the hot fluids may spurt out and cause burns. Slowly loosen the radiator cap to release the internal pressure or the hot coolant may spurt out and cause burns.

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CAB STRUCTURE PRECAUTIONS

The ROPS (Roll Over Protective Structure) must never be removed from the machine. The ROPS is installed to protect the operator if the machine should roll over. The ROPS supports the load if a roll over occurs and also absorbs the impact.

The ROPS fulfills all the regulations and standards for all countries. The ROPS should not be modified, without written authorization. If the ROPS becomes damaged because of a roll over, the strength may be reduced and it may not able to fulfill its function properly for future use. If the machine rolls over while working, have the dealer inspect the cab structure before proceeding with work.

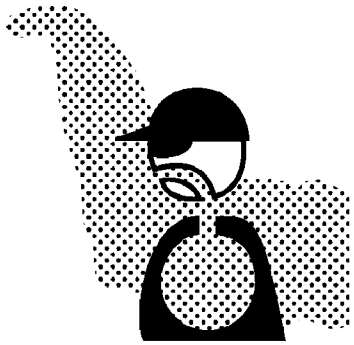
OPTIONAL EQUIPMENT PRECAUTIONS

When installing optional equipment, read the instruction manual related to the option before installing or using it.
Do not use optional equipment, without written permission from Komatsu. Unauthorized equipment may create safety problems or could affect the life of the machine. Komatsu cannot be held liable for injury, accident, or product failure resulting from the installation and use of unauthorized equipment.

DUST HAZARD PRECAUTIONS

Asbestos dust can be hazardous to your health if it is inhaled. Komatsu does not use asbestos in its products. But if handling materials containing asbestos fibers or other dust materials during demolition operations, always do the following.

- Never use compressed air for cleaning.
- Spray water to keep the dust down.
- If there is a danger there may be asbestos dust in the air, operate the machine with the wind to your back whenever possible.
- Use an approved respirator.
- Do not allow any other person into the area during operation.
- Nongenuine parts may contain asbestos. Use only genuine Komatsu parts.
- Always observe the rules and regulations related to the job site and working environment.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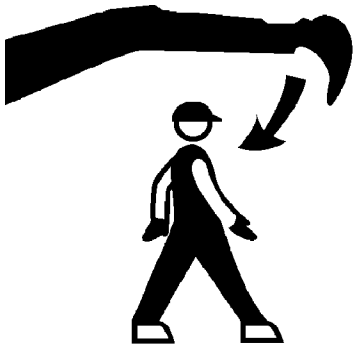
CRUSH OR PINCH POINT DANGERS

Never stand under or place any part of your body between the movable components such as the work equipment and cylinders or between the machine and work equipment.

When operating the work equipment, clearances change. Be alert to those changes or serious personal injury or death could result.

Never drive up to any one standing in front of a solid object or your path of travel. The brakes could fail or the machine could slide on a slippery surface causing injury or even death.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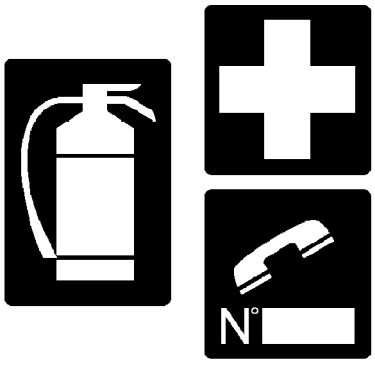
FIRE EXTINGUISHER AND FIRST AID KIT

As a precaution if a fire or an injury should occur, always keep a fire extinguisher and first aid kit on your machine and do as follows:

- Be sure that the fire extinguisher is fully charged. Read the label on it to ensure proper use.
- Keep a first aid kit in the storage area. Check the kit periodically and make any additions if necessary.
- Keep a list of emergency phone numbers in case of an accident.



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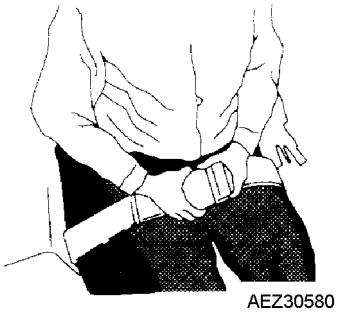
INSIDE THE OPERATOR'S COMPARTMENT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Before entering the operator's compartment, always remove mud and oil from the soles of your shoes. If you operate the brake pedal with mud or oil on your shoes, your foot may slip and may cause an accident.

After using the ashtray, make sure matches or cigarettes are properly extinguished and be sure to close the lid. If the ashtray is left open, there is danger of fire.

Do not leave cigarette lighters or aerosol cans lying around the operator's compartment. If the temperature inside the operator's compartment becomes too hot, the lighter or aerosol cans may explode.

Do not stick suction pads to the window glass. Suction pads may act as a magnifying glass and could cause a fire.

Do not use cellular telephones inside the operator's compartment when driving or operating the machine.

Never bring any dangerous objects such as flammable or explosive items into the operator's cab.

To ensure safety, do not play the radio, CDs, or tapes when operating the machine.

Keep the operator's compartment clean. Never allow trash or tools to accumulate. These may hinder the operation of the controls or pedals.

When operating the machine, do not put your hands or head out of the window beyond the protection of the ROPS.

Always use the seat belt equipped with your machine. Be sure the seat belt is fastened snugly around your waist before operating the machine.

PRECAUTIONS BEFORE STARTING ENGINE

Before starting your work operations it is important to perform several procedures to be sure your equipment is in good operating condition. Be aware of the hazards involved when operating your machine.

PREOPERATIONAL CHECKS

Before starting your machine and proceeding with any work operations it is important to be sure your machine is safe to operate. Below is a list of some basic items to check before any work is to begin. If any problems are found during your preoperational check, repair them immediately. Never operate a machine that is unsafe, or damaged and in need of repair.

WALK-AROUND CHECK OF MACHINE

A. Look for any obvious missing or damaged items.

B. Check the condition of the loading and backhoe buckets. Look for loose or missing attachment pins, damaged surfaces or missing parts.

C. Check the condition of all visible hydraulic hoses. If hoses are worn or leaking fittings, cut, scuffed, or cracked hose surfaces and replace immediately.

D. Check for leaking or damaged hydraulic cylinders. If any cylinder is damaged or leaking, repair it immediately.

E. Inspect the mechanical lift, dump and backhoe arms and pivot points. Look for any loose or missing parts, cracked, bent or damaged areas.

F. Be sure all safety decals are in place and are not damaged. Be sure they are clean and visible for all personnel to see.

G. Check the condition of the front and rear tires. Look for excess wear or cut surfaces, objects imbedded in the tire or under inflation.

H. Check under the machine for any build-up of debris, trash, or leaks. Remove any debris found and have any leak checked by authorized personnel.

I. Inspect the fuel and hydraulic tanks for damage or leaks. Be sure the fill caps are installed and locked in place.

J. Be sure the steps are not damaged or covered with mud.

K. Check the condition of the cab. Inspect the windows, mirrors, hand holds, work lights, directional and canopy for any damage or missing parts. Be sure all locks are functional.

L. Check the exhaust stack. Be sure it is not damaged, kinked, or restricted in any way. Be sure the exhaust outlet is facing away from the cab and is not restricted.

UNDER THE HOOD

A. Open the hood and check all fluid levels. be sure they are at the specified level outlined in the maintenance section.

B. Check the engine and radiator for any build up of trash, wood chips, rubbish, leaves or other flammable materials. If flammable materials are found as well as excess build up of oil or dust, remove the flammable material and clean the engine.

C. Be sure the hood closes properly and will lock securely to prevent tampering by others.

IN THE OPERATOR'S CAB

A. Check the condition of the cab floor. Be sure it is clean and free from tools, objects, excess dirt, trash or grease.

B. Check to be sure both doors open and close properly. Be sure the right door is unlocked for safety purpose.

C. Check the windows for cleanliness. Remove any stickers or objects pasted to the windows.

D. Make sure the fire extinguisher is in place and fully charged.

E. Be sure the operator's manual, safety manual and all cab safety decals are in place and in good condition.

F. Check to be sure the seat belt and seat works properly.

START-UP CHECKS

⚠ WARNING

When performing start-up checks, be sure your machine is in a well ventilated area.

A. Start the engine and allow it to idle at a low RPM.

B. Check the operation of all gauges and warning systems. Be sure they all work and come up to normal operation.

C. Check the operation of all switches. Be sure the lights, wipers, directional, horn and warning flashers and alarms work properly.

D. Check the brakes, throttle operation and steering wheel. Be sure they are clean and free from dirt or grease.

E. Check the operation of all work controls.

Remark

It is important that a preoperational check be performed at the beginning of your work shift. Perform this step even if taking the machine operations over from another operator.

ROOM VENTILATION

Exhaust gases are deadly. If starting the machine inside a building, connect a suction duct to the exhaust pipe.

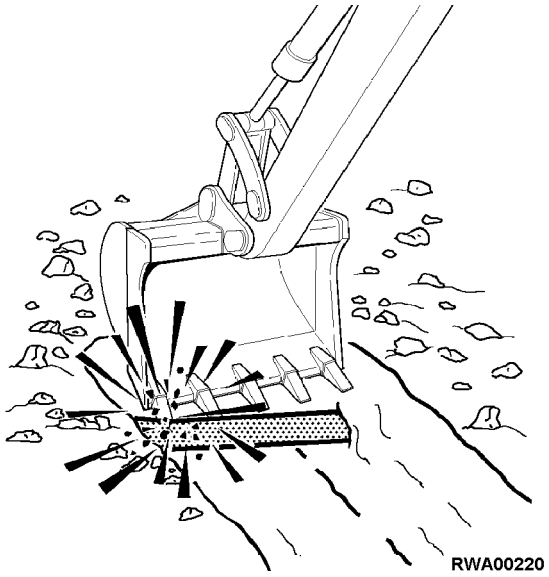
STARTING WORK OPERATIONS

- Before operating the machine, walk around it and check for people or objects that might be in the way.
- Do not start the engine if warning tags have been attached to the steering wheel or control levers.
- Sound your horn to warn others in the area before starting the engine or moving the machine.
- Operate the machine in a seated position only, with the seat belt fastened snugly around your waist.
- Do not allow anyone in the cab or on the machine during operations.

WORK HAZARDS

Before proceeding with any excavating, be aware of the hazards involved with this operation. Below is a list of hazards to avoid.

- Before starting any excavating operations, contact all utility departments in your area and have them identify and mark any underground system locations (gas lines, water lines, electrical lines, telephone lines, sewer lines, etc.).
- Check the work area for any unusual ground conditions.
- Make sure the work area is as level as possible and that the machine is able to maneuver easily.
- If you will be working near a high traffic area, (pedestrians or cars) have a dedicated worker directing traffic. Or, install safety fencing around the work site.
- Be alert for changing work site dangers or distractions.

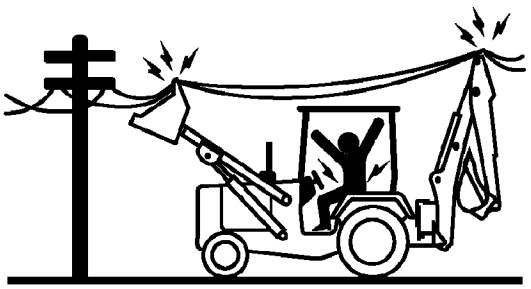


WORKING CLEARANCES

Be aware of your clearances around, in front, behind and above your work area or travel route.

The backhoe boom is 1m (3 ft.) above the canopy. Thus, the operator cannot see the top of the boom in the travel posture. A second person should be on the ground observing and warn the operator of impending hazards.

Several digging operations precautions exist. Overhead electric lines are extremely dangerous and may cause electrocution if the minimum safe distance in the chart below is not observed. When digging, call the power company and telephone company to determine if underground power lines and telephone lines exist in the area. If so, have the company specify the exact location and depth of the lines.



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Some basic safety precautions to reduce the risk:

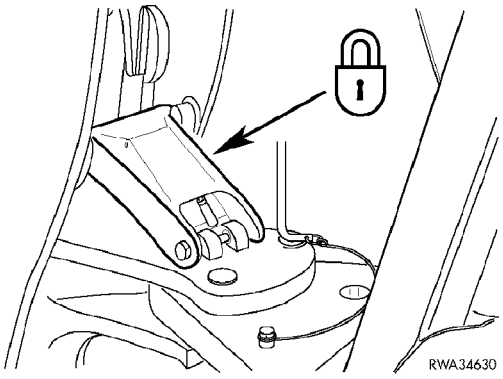
- Wear shoes with thick rubber or leather soles.
- Know the phone number of the power company and closest hospital with an emergency room.
- When working or traveling in an area where clearances are a problem, travel at a slow speed.
- If you are not sure of your clearances, request the aid of another person who can guide or warn you if you get too close to objects.
- High humidity may pose an electrical hazard when working near high-voltage lines, even if your machine clears the overhead power lines.
- If your machine should come in contact with overhead electrical lines, stop the machine. Remain inside it until the power company clears the lines and it is safe to leave the machine.
- If low-hanging power lines pose a hazard, ask the power company to remove the lines until your work is finished.

Cable Voltage	**Min. Safe Distance**	
6.6kV	3 m	10 ft.
66.0kV	5 m	16 ft.
275kV	10 m	33 ft.

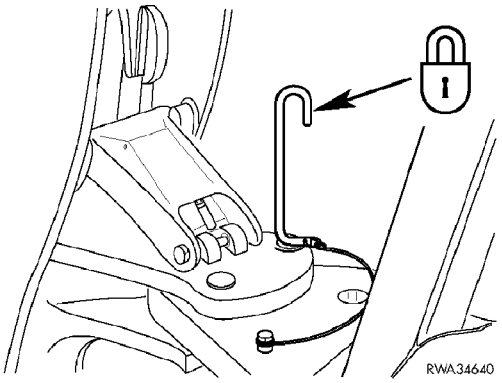
ROAD TRAVEL

The machine is equipped with multifunction safety locks. They must be used for maintenance operations and road travel. Before traveling on roads, proceed as follows:

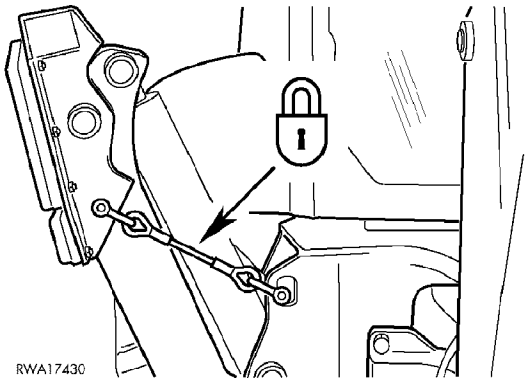
1. Raise the backhoe boom and engage the safety coupling. Retract the arm, and telescoping arm if so equipped, and curl the bucket.



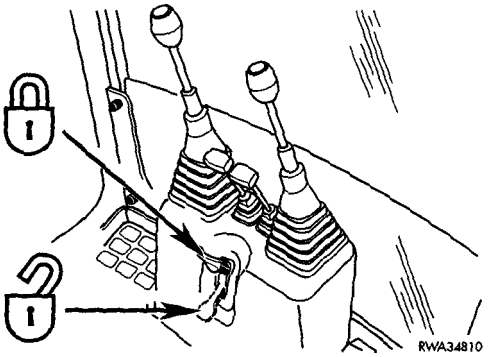
2. Center the boom and install the lock pin.



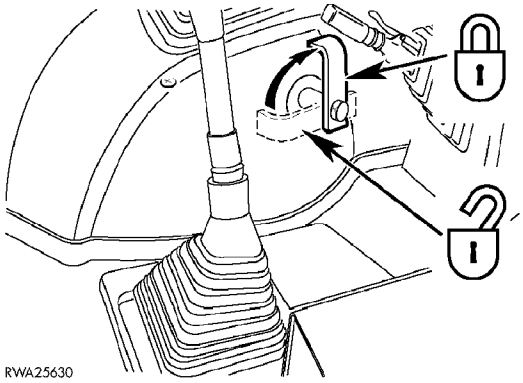
3. Connect the safety cables to prevent accidental lowering of the outriggers.



4. Lock the backhoe control levers using the safety lock that is equipped with the machine.

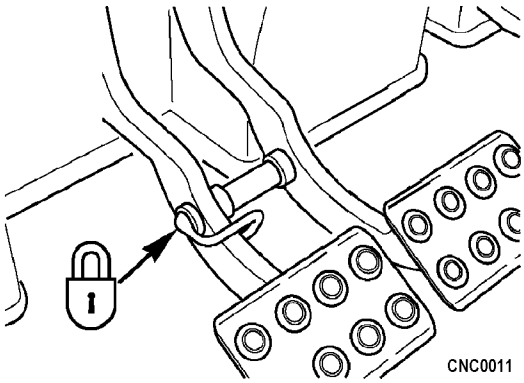


5. Raise the loader bucket to a safe travel height of 30-40 cm (12 to 16 in.) from the ground. Lock the loader control levers using the safety lock that is equipped with the machine.



6. Be sure the brake pedals are locked together and the 4-wheel drive feature is disengaged.

7. Obey all traffic rules when traveling on local and state roads. Always travel at a safe, controllable speed.



TRAVELING IN REVERSE

Traveling in reverse may pose several hazards. Below is a list if some basic rules to follow when traveling in reverse.

- Be sure the area behind you is clear of people or objects that might be in the way.
- Before moving your machine, sound the horn to warn others in your area you are moving.
- When operating in areas that may pose a hazard or has poor visibility, designate a person to direct your movements.
- Do not rely totally on the mirrors because blind spots exist.

TRAVELING ON ICY OR SNOW-COVERED SURFACES

If the ground is icy or covered with snow, the steering may not be as responsive as expected. To limit the risk resulting from reduced maneuverability, proceed as follows:

- Engage the four-wheel drive. Four-wheel drive will not affect the braking.
- Travel at a slow safe speed.
- Avoid rapid acceleration or braking.
- Avoid sudden steering movements, especially with a short turning radius.
- Stopping distances are reduced during slippery conditions. Thus, downshift the transmission and use the engine as a brake to decrease the machine's speed, and then apply the service brakes.
- If using the machine for snow plowing, be careful of objects — signs, posts, large rocks, etc. — buried in the snow.

WORKING ON LOOSE OR UNSTABLE GROUND

To limit the risk when working in these areas:

- Avoid operating the machine too close to the edge of a cliff, open trenches, or ditch lines. These areas may collapse under the weight of the machine, causing serious injury to the operator.
- Keep in mind after a heavy rain or thaw, the surface conditions become less stable.

VISIBILITY

- When visibility decreases due to darkness, turn on the road lights, working lights, or both.
- If reduced visibility is a result of fog, smoke, whiteout conditions (blizzard), or heavy rain, stop the machine in a safe place as soon as possible. Wait for the conditions to improve before resuming work.

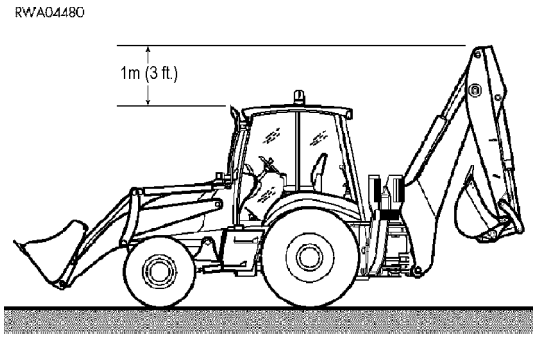
PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT

- Working in tunnels, beneath bridges or under cables (telephone or power) and any other situation where the height is limited, ensure that working with the backhoe or bucket will not cause any damage.

TRAVEL POSITIONS

The operator must be seated with the seat belt fastened snugly around the waist. Position the seat so you are comfortable and able to see all areas around you and have easy access to all controls.

The illustration to the right shows the proper travel posture for the machine. The backhoe must be fully retracted and locked in place as well as both outriggers. See “BACKHOE LOCKS” on page 1-23. Always keep the bucket at least 50 cm (20 in.) above the ground.



WARNING

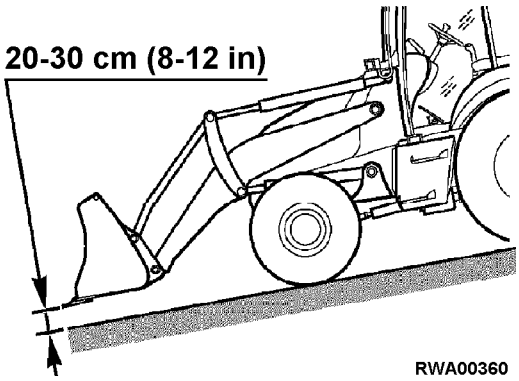
A section of the backhoe boom is 1m (3 ft.) above the canopy. Thus, the section of backhoe above the canopy cannot be seen by the operator when the machine is in the travel posture.

Never shift the transmission into neutral when on a slope or hill. If the machine should lose control or slide on the slope or hill, lower the bucket to the ground immediately to help stabilize the machine.

TRAVELING ON SLOPES

Before traveling up a slope, check the fuel supply so the machine does not run out of fuel while on the slope. And check the brakes to be sure they are locked and in good working condition.

On hills or slopes, lower the bucket to a traveling height from 20 to 30 cm (8 to 12 in.) above the ground.



When traveling up a slope with an empty bucket, travel with the bucket directed in an upward position.

When traveling up a slope with a loaded bucket, always keep the bucket at least 50 cm (20 in.) above the ground. Never raise the bucket when traveling on a slope.

Remark

If the machine should start to tip with the bucket loaded, immediately lower the bucket to the ground to help stabilize the machine and lower the center of gravity.

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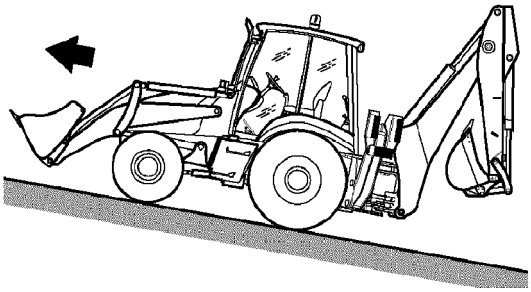

When traveling down a slope or hill with an empty bucket, travel with the bucket facing downward.

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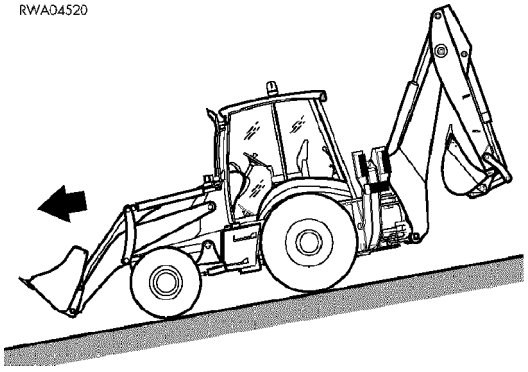

When traveling down a slope with the bucket loaded, back the machine down the slope with the bucket facing the top of the incline. Always keep the bucket at least 50 cm (20 in.) above the ground. Never raise the bucket when traveling on a slope.

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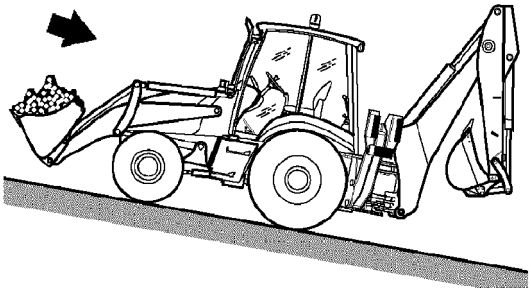
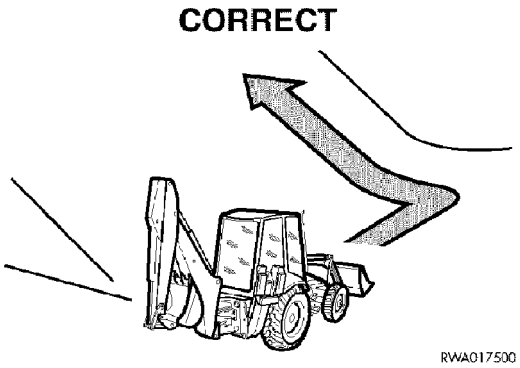


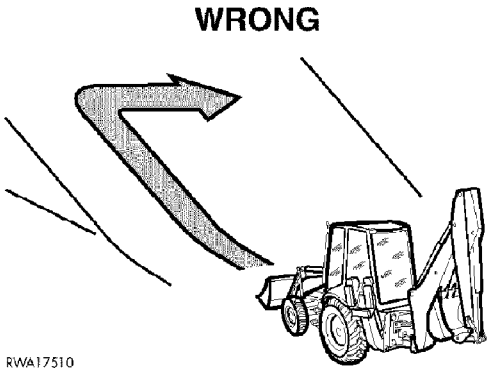
Remark

If the machine should start to tip with the bucket loaded, immediately lower the bucket to the ground to help stabilize the machine and lower the center of gravity.

Always travel straight up or straight down the slope. Never turn or travel sideways on the slope or incline. Doing so may cause the machine to rollover.



Never turn on a slope or travel across a slope.

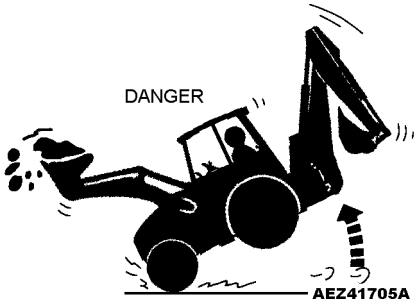


Never change speed ranges when on a slope or hill. Always set the machine in a low speed range for travel on a hill or slope. Never use the feature buttons when the machine is on a slope or loss of control may result.

Always be aware of your travel surfaces. Wet leaves, wet grass, or mud may hinder control of the machine.

BUCKET PRECAUTIONS

- When hauling with a loaded bucket, keep the bucket at least 50 cm (20 in.) above the ground.
- To reduce the risk when soil must be dropped over an edge or a cliff, dump one pile a safe distance from the edge. Dump a second pile between the backhoe and the first pile. Use the second pile to push the first pile over the edge. Repeat this procedure as many times as needed until only one pile remains. With the last pile, use extreme caution to push it over the edge.
- While pushing a pile of soil over the edge, the load becomes lighter. Thus, the speed of the machine automatically increases. Be alert and ready to adjust the speed of the machine, including using the service brakes.
- To prevent the machine from tipping when it has a fully loaded bucket, avoid fast starts, sudden stops, and sharp turns.



- Never raise the bucket too high or tip the bucket back too far when handling awkward loads — round or cylindrical objects, scrap, or timber — or the load can fall onto the cab and cause death or serious injury to the operator and damage the cab.

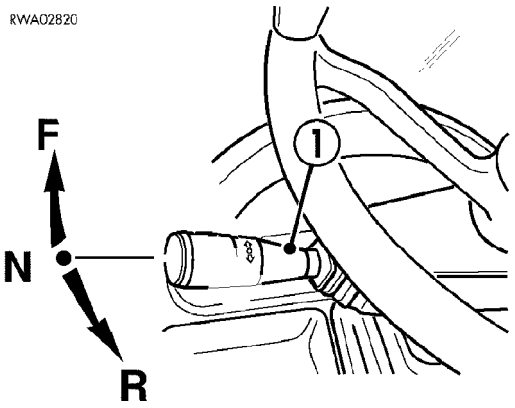
- Never use the bucket or boom arm as a crane, drag line, or hoist. Use the backhoe for its intended use only. Performing nonapproved operations can cause serious injury, and breakdowns that void the warranty.

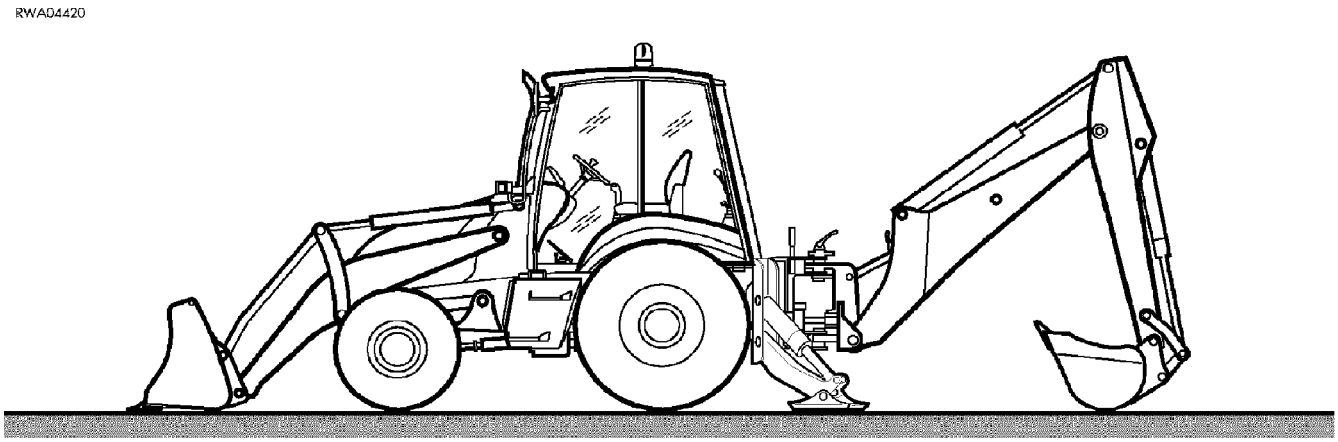
PARKING THE MACHINE

The Komatsu backhoe is set-up to be parked in a secure manor. If you will be leaving the machine for a short or long period of time, use all the security features equipped with the machine.

PARKING ON LEVEL GROUND

1. Find a flat level surface to park on.
2. Place the directional control (1) in the neutral (N) position.
3. Lower the work equipment to the ground
4. Lower the outriggers to the ground.
5. Turn the engine off and remove the ignition key.
6. Set the parking brake.

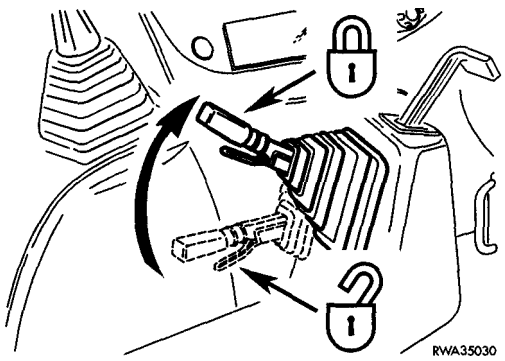




PARKING FOR LONG PERIODS OF TIME

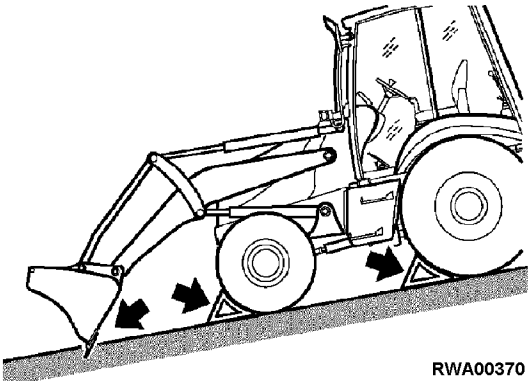
The possibility of having an unauthorized person tampering with the machine when it is unattended is significant. Besides performing the same procedures listed above, use the locks when the machine is unattended.

Keep in mind you are responsible for the security of your equipment when it is unattended. Properly locking and securing the equipment will help in protecting it from unauthorized access.

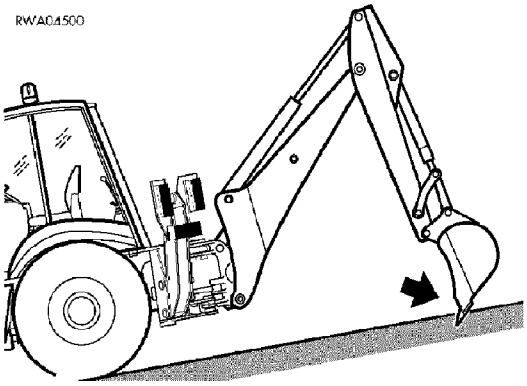


PARKING ON AN INCLINE

Although parking on a slope is not recommended, certain situations dictate that you do. Lower the front end loader and dig the leading edge into the ground several inches. Be sure the bucket is tipped forward to help keep the digging force in a downward position. Move the control lever into the “Free Float” position. Place blocks under both front and rear wheels to help secure the machine in place.



When setting the backhoe on the ground, dig the bucket teeth into the ground to help hold the machine in place. Do not raise the back end of the machine up when doing this procedure.

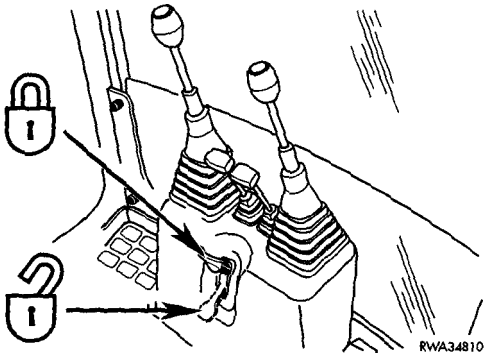


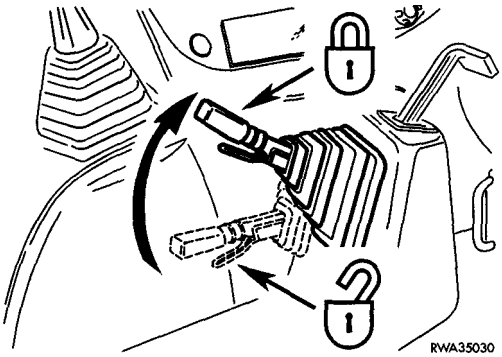
WARNING

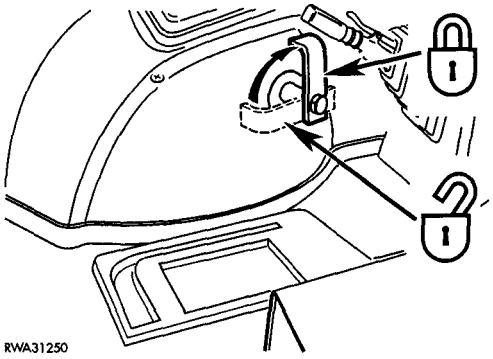
Never park the machine with the wheels off the ground. Always fully lower the work equipment and machine to the ground when parking the machine.

After performing the above, do the following:

1. Place the directional control (1) in the neutral (N) position.
2. Lower the work equipment to the ground.
3. Turn the engine off and remove the ignition key.
4. Apply the parking brake.
5. Apply all locks.







SAFETY LOCK USAGE

When it is necessary to perform maintenance, repairs or travel on roads, it is important to be aware of the safety locks equipped with the machine. It is also important to know how to use these locks and when to use them. Failure to observe these precautions and use the safety equipment may result in a serious accident or injury.

⚠ WARNING

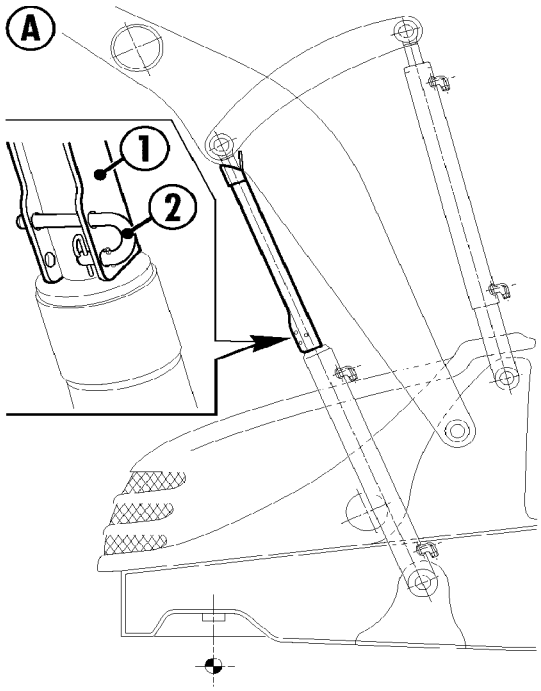
Use safety locks when:

- **Performing any maintenance on the machine.**
- **When traveling on roads.**
- **When the machine will be unattended.**

FRONT END LOADER CYLINDER LOCK

Refer to illustration (A). The front end loader cylinder lock (1) must be used any time you will be performing maintenance on the machine with the front end loader raised. To use the cylinder lock:

1. Refer to illustration (B). Remove the cylinder lock assembly pin (2) that holds onto the lock unit (1).
2. Using both hands lower the lock unit (1) down from it's storage position and remove it from the lift arm.
3. Raise the front end loader unit completely in the air extending the lifting cylinders.
4. Install the cylinder lock (1) in the position shown in illustration (A). Keep the safety pin boss against the lift cylinder gland nut.
5. Insert the safety pin (2) completely into the predrilled holes. Lock the safety pin (2) in place with the smaller pin provided.
6. Slowly lower the front end loader unit until it makes contact with the cylinder lock.
7. Check to be sure the cylinder lock is securely in place before proceeding with any procedures under the front end loader.



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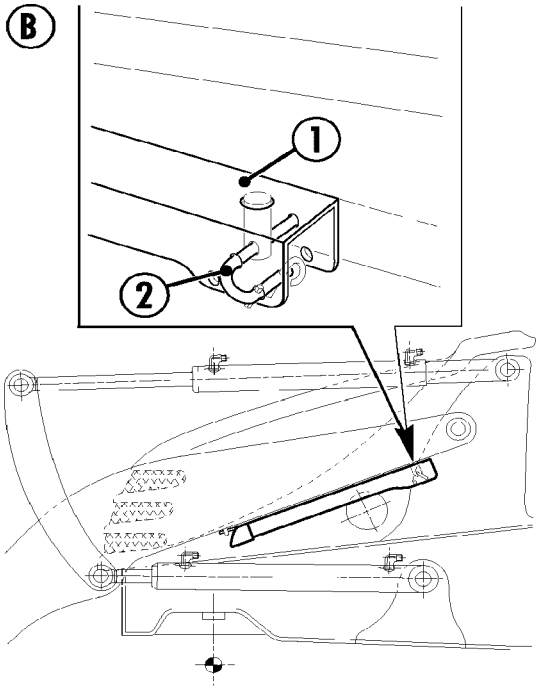

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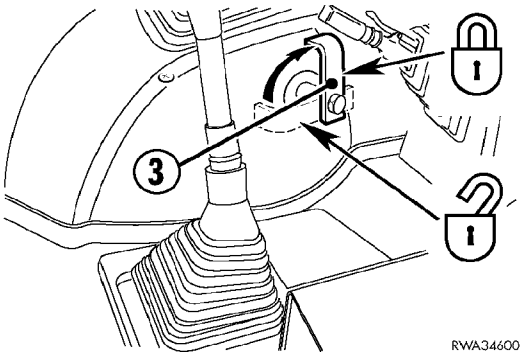
8. Using the safety lock (3) in the operator's cab, lock the loader control before proceeding with any repair or service operations.

9. After completing the work, unlock the safety lock (3). Raise the front end loader up slightly to relive tension on the cylinder lock.

10. Carefully remove the small pin and the safety pin (2). With both hands, remove the cylinder lock (1) completely.

11. Lower the front end loader to the ground.

12. Reinstall the cylinder safety lock (1) to the storage location on the left lift arm shown in illustration (B)



⚠ WARNING

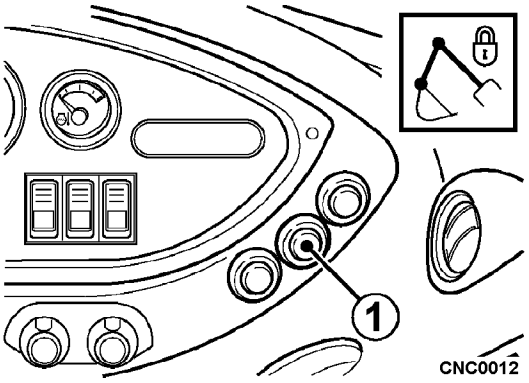
Always keep the cylinder-safety lock with the machine. Never use a substitute or damaged cylinder lock. If it is missing or damaged, replace it immediately.

BACKHOE LOCKS

The backhoe locks secure the backhoe in a travel position. Use these locks when traveling with the machine or using the front end loader. To use the backhoe lock:

1. When the machine is in operation and the backhoe is being operated, disengage the backhoe boom lock.

2. To use the backhoe boom lock, press the switch (1).

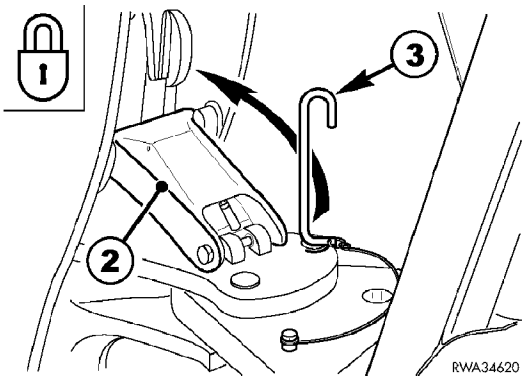


3. Retract the arm, and telescoping arm if so equipped, and curl the bucket.

4. Press the boom lock switch (1) to engage the boom locking device (2).

5. Center the backhoe unit to align the lock pin holes in the backhoe mounting boss.

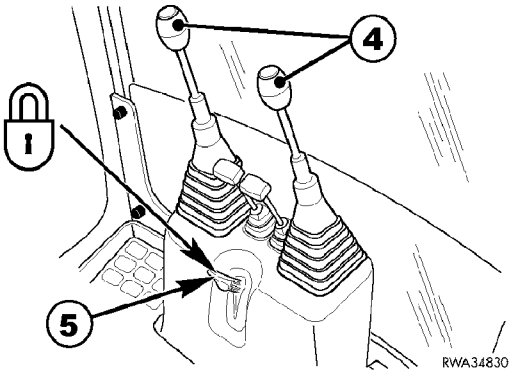
6. Remove the centering pin (3) from it's holding location and insert it in locking holes in the backhoe mounting boss.



7. Be sure the pin (3) drops down completely and is flush with the top of the backhoe boss. After installing the lock pin (3), the backhoe assembly will not swing.

8. Lock the backhoe wobble stick controllers (4) using the locking lever (5).

9. Move the wobble sticks (4) to be sure they are locked.



10. If traveling or using the front end loader for a long period of time, lock the outriggers in place to avoid possible hydraulic drift.

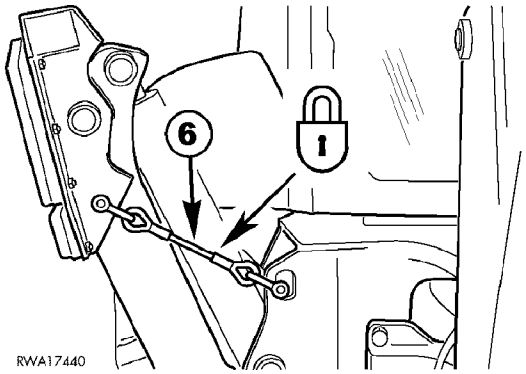
    A. Unlock the lever (5) to raise the outriggers.

    B. Retract both outriggers completely.

    C. Install the locking safety cables (6) on both outriggers and be sure to relock the wobble stick lock (5).

Remark

The lock pin and the safety cables must remain with the machine. If they are lost or damaged, replace them.



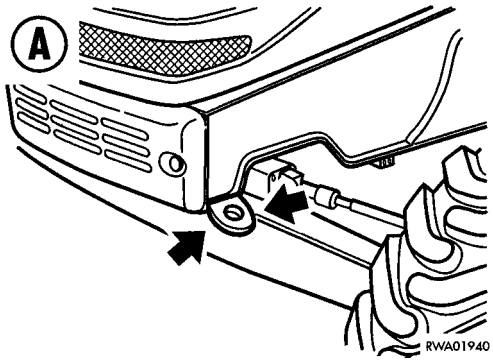
TRANSPORTING THE MACHINE

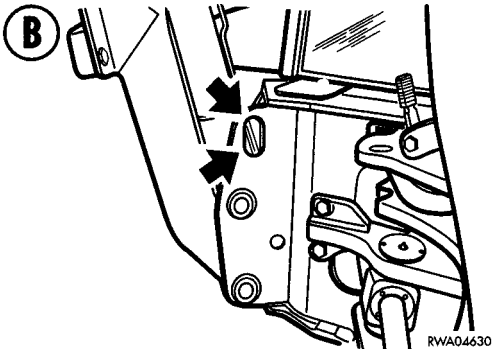
⚠ WARNING

Before transporting the machine, ensure that the transport truck is capable of supporting the machine's weight. Perform the loading and unloading of the machine on flat, dry ground and at a safe distance from the edge of the road or ditches. Position chocks behind and in front of each tire of the transport vehicle before loading or unloading the machine. Ensure that the ramps are of the same length and parallel to each other, and firmly anchored to the transport truck. Check that the ramps can safely support the machine; if not, purchase new ramps. Remove any grease, oil, or ice from the ramps before unloading or loading the machine. Maximum ramp inclination is 15 degrees.

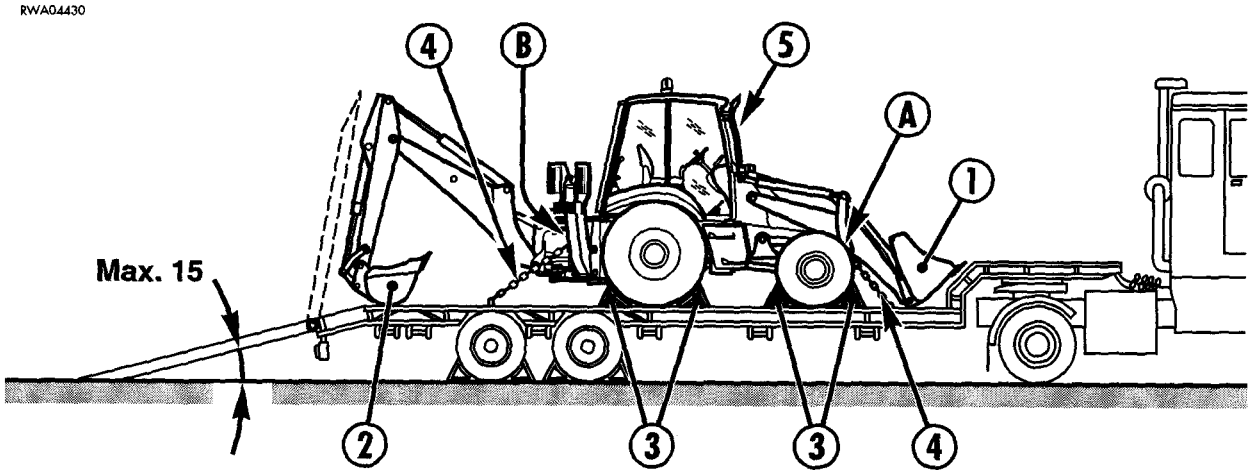
LOADING AND SECURING THE MACHINE

Locate the tie down and transportation brackets (A, B) on the machine. Be sure they are in good condition.





Angle the loading ramps not greater than 15 degrees. Position the machine squarely with the ramps. Raise the loader bucket high enough to clear all surfaces. Travel straight up the ramp at a slow speed in low range with the bucket (1) facing forward. Do not change direction when on the ramp; if repositioning is needed, back down the ramp and realign the machine to the ramps. After loading the machine, rest the front bucket on the floor, set the machine in neutral and apply the parking brake. Lower the backhoe (2) onto the floor. Set all control locks, including the backhoe lock pin. Turn the ignition off and remove the key. Secure the machine with chains (4) at the anchor points (A, B). Place chocks (3) behind and in front of each wheel.



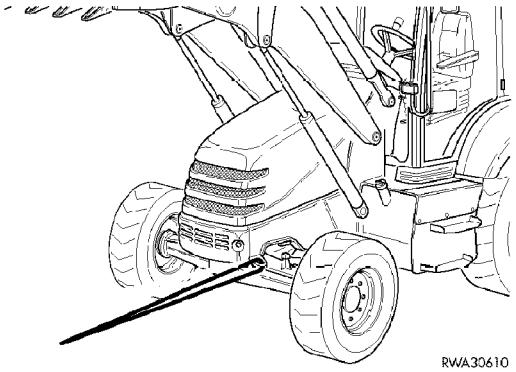
⚠ WARNING

Once the machine is on the transport truck, measure the maximum height of the machine while on the flat-bed and the weight. The advance information is needed before accessing bridges, tunnels and roads with weight restrictions. Check with local officials for transport regulations throughout the entire route.

EMERGENCY RECOVERY

The machine is equipped with emergency recovery hooks for emergency recovery only. The machine is not designed to be towed, especially by the front loader or backhoe. These hooks are only for temporary use to get the machine into a secure area so the proper repairs can be made.

MOVING THE MACHINE

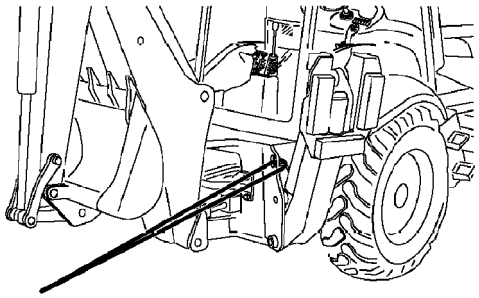

RWA30610

If the machine cannot move under its own power, it is important to follow some simple procedures

Place all the controls in neutral and disengage the four-wheel drive system before moving the machine.

Use recovery hooks and towing cable rated at F=6,200 dN (13,938 lbs.). Tow the machine just far enough to perform the essential repairs.

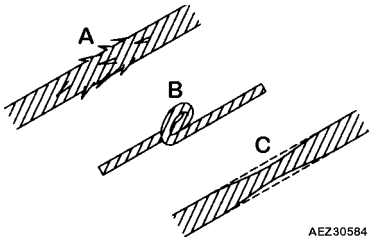
Never tow the machine at an angle. Always tow the machine in a straight line. Ensure the tow cables are the same length before towing.


RWA34680

⚠ WARNING

Never stand next to the tow lines when towing the machine. The cable or chain could brake causing injury. Always stay clear of the towing equipment.

NEVER use cable that has cut strands (A), has kinks (B), or has a stretched section (reduced diameter) (C).



AEZ30584

PRECAUTIONS DURING MAINTENANCE

Only trained and authorized personnel should perform the maintenance. It is important to follow the outlined maintenance procedures and safety information outlined in this manual and in the shop manual for this machine.

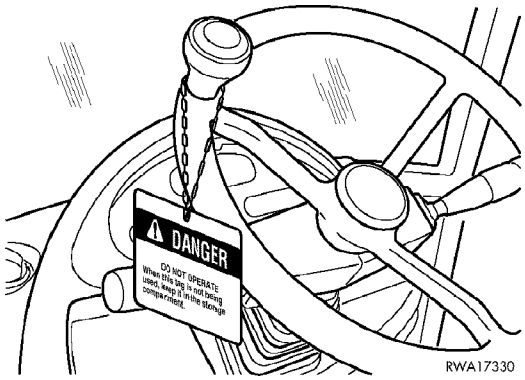
WARNING TAGS

Before performing any maintenance operations on this machine, position the machine on a level and firm surface.

Lock the equipment controls. Remove the ignition key and tag the steering wheel.

Alert all personnel in your area that the machine is down for maintenance. If necessary, tag the machine around specific points to warn others that this machine is down for maintenance.

If the machine will be down for maintenance for a long period of time, be sure to check and see if the warning tags are still in place before you start your repair procedures the next day.



EQUIPMENT STORAGE

Always store optional or extra work equipment in a safe and secure location.

Store equipment so that it cannot fall or cause injury to others.

WORKING UNDER THE MACHINE


RWA02520

Always use approved jack stands to support the machine when performing maintenance under the chassis.

Never rely on hydraulic jacks or the machines work equipment to support the machine when working under or on the machine.

Always lower the work equipment to the ground after raising the machine for repairs.

USING DROP LAMPS


A0055160

Use only approved antiexplosion proof lamps when servicing the: fuel system, hydraulic oil system, brake system or batteries. Nonapproved lamps can cause an explosion or fire should the bulb break.

KEEPING THE MACHINE CLEAN


RWA01330

Never use flammable liquids to clean your machine. Use only approved nonflammable cleaning solvents to clean parts or the machine itself.

Avoid using high pressure steam cleaners or caustic soaps to wash the machine, if possible. Steam cleaning or using caustic soaps may damage paint, wiring, or sensitive electrical components.

Never use high-pressure water or flood the inside of the operator's cab. Doing so may damage sensitive electrical components.

When pressure washing, use high-pressure hot water and mild grease cutting soaps.

Always grease the machine after cleaning to push any water out of the pivot point connections.

ENGINE OPERATION DURING MAINTENANCE

If the engine must run during maintenance, be sure all work equipment is locked. Have someone remain in the operator's seat while the engine is running, in case the engine must be shut down quickly.

REFUELING PRECAUTIONS


RWA00980

Always clean up any spills. Grease, fuel, oil, or coolant spills can pose a trip hazard if not moped up immediately.

Be sure the correct fluids are added to the proper location. Incorrect fluids can cause damage to internal components.

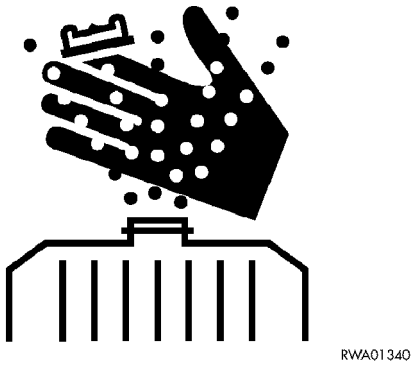
When refueling or adding any fluids, be sure you are in a well ventilated area.

Never smoke or allow flames near the machine while refueling.

Never mix gasoline with diesel fuel. Gasoline is extremely flammable and could cause an explosion.

Do not fill the fuel tank completely. Leave room inside the fuel tank for the fuel to expand.

COOLING SYSTEM PRECAUTIONS

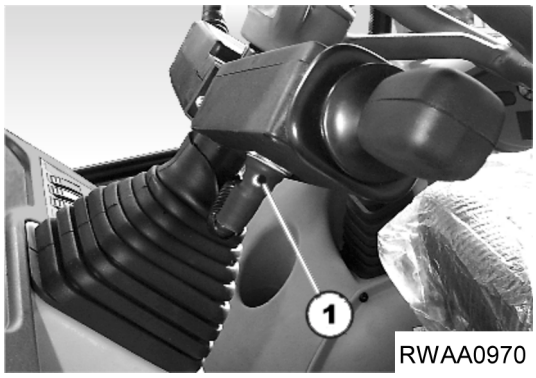

RWA01340

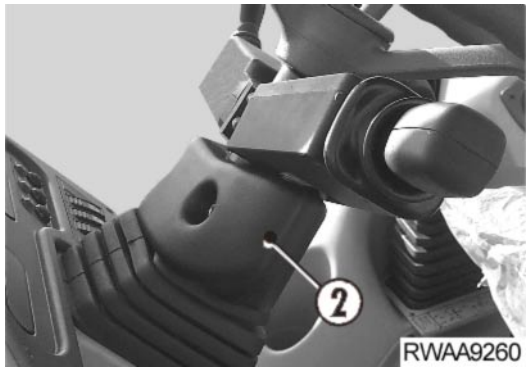
Never add coolant to a hot or warm engine. Always allow the engine to cool down completely before opening the radiator cap.

Never dump used coolant on the ground, in a lake, in a stream, or in a sewer system. EPA Law requires these fluids to be captured and recycled properly. Failure to do so is in violation of the law.

GEARSHIFT PRECAUTIONS

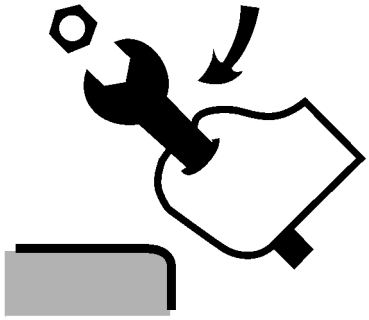
Before performing electrical welding operations, disconnect the gear-shift connector (1) under the steering wheel. To reach the connector, remove the protection casing (2).





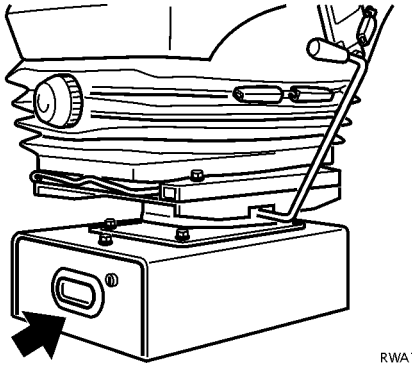
TOOLS

Use only hand tools provided with the tool kit or other high-quality tools. Replace worn or damaged tools.



RWA01310

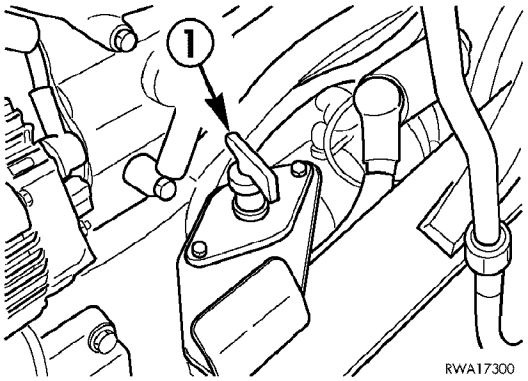
Store the hand tools in the seat support.



RWA17480

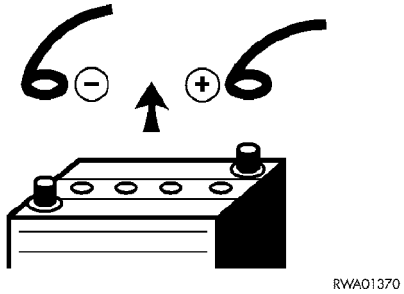
BATTERY PRECAUTIONS

Before servicing the battery, the electrical system, or arc welding, turn the battery disconnect switch (1) counterclockwise and remove it. The switch is located inside the engine compartment on the left side.

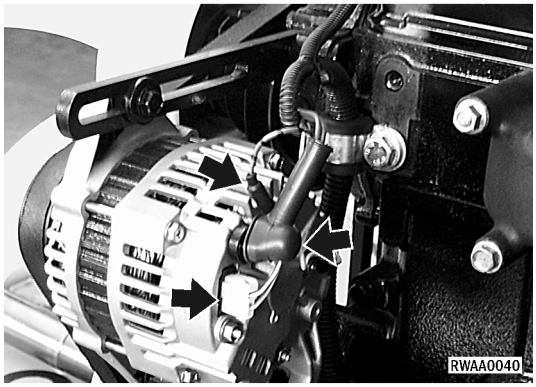


When disconnecting the battery, disconnect the negative (-) battery cable, then the positive (+) cable.

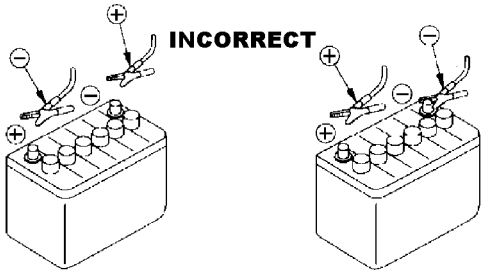
On completion of work, insert the battery disconnect switch (1) and turn it clockwise. Reconnect the positive (+) battery cable, and then the negative (-) cable.

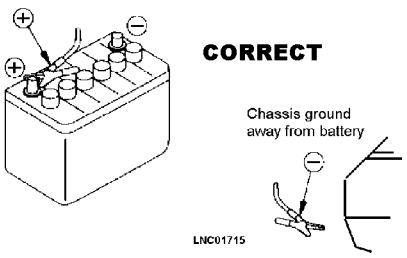


If arc welding, also disconnect the electrical leads from the alternator.



When using jumper cables to start the machine, hook the positive (+) jumper first. Then connect the negative (-) jumper to a location on the chassis to prevent a spark at the battery igniting the hydrogen gases generated by the battery.





STARTER PRECAUTIONS

Never try to start the machine by tampering or shorting the starter terminals. Accidental machine movement could cause injury or even death.

Always start the machine while seated in the operators cab using the ignition switch.

See See “BASIC TROUBLESHOOTING” on page 3-5.

RWA04890

HIGH-PRESSURE HOSES

Do not use bent, cut, or cracked tubing or hoses that have been previously rejected because of leaks or other defects. Faulty hoses can burst during operation, causing personal injury or fire.

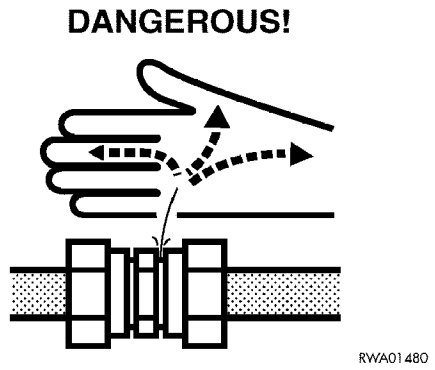
Repair or replace any loose or faulty fuel or hydraulic lines immediately. Do not operate the machine with damaged or leaking hoses or lines.

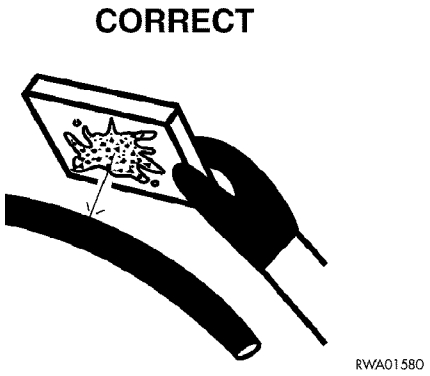
Hydraulic systems are always under pressure. If servicing or inspecting the hydraulic system, lower the work equipment to the ground. Release system pressure and residual tank pressure before servicing.

Leaks from pressurized hydraulic lines are extremely dangerous because the spray can penetrate the skin and enter the bloodstream.

Always wear thick gloves and protective goggles when working on the hydraulic systems. Use a sheet of cardboard or plywood while searching for leaks.

If struck by high-pressure hydraulic fluid, consult a doctor immediately for appropriate treatment.



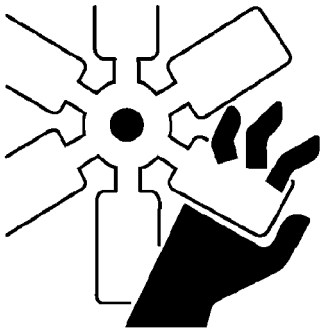


HIGH-TEMPERATURES AREAS

Immediately after turning the engine off, the following items remain hot or under pressure: engine coolant, engine oil, hydraulic oil, all engine parts, and exhaust stack. Perform maintenance only when the machine has had time to cool down. If not, serious injury, including severe burns, could result.

ROTATING PARTS

Be alert when working near rotating parts. Keep arms, hands, and legs a safe distance from the rotating parts. If hands, clothing, or tools become entangled in the fan blades or fanbelt, severe injury may result.



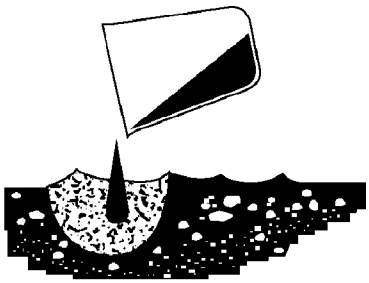
RWA01660

DISPOSAL OF WASTE MATERIALS

Never dump waste fluids in a sewer system, on the ground, in rivers, etc.

Always drain fluids from your machine into the appropriate containers. Never drain fluids directly onto the ground.

Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, filters, batteries, coolant, brake fluid and hydraulic oil.

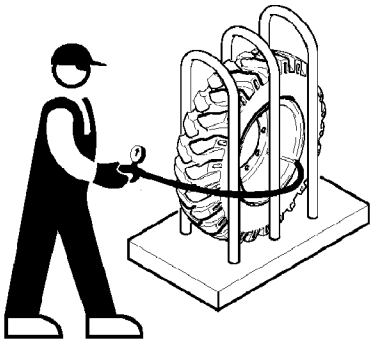


RWA01670

INFLATING TIRES

Tires can burst while being inflated, causing serious injuries. Before servicing the tires, observe the following precautions:

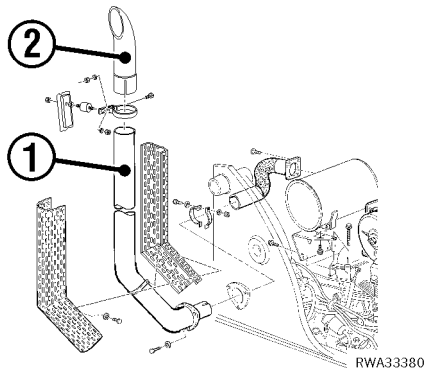
- Before inflating tires, always check the wheel rims, tire walls, and tread for cuts, broken cords, or other damage.
- Have a tire expert perform checks and tire maintenance.
- When inflating tires, use a protective cage, and a compressed air gun with extension hose and pressure gauge.
- Make sure there is nobody in the vicinity before starting to inflate a tire. Stand to the side of the tire while inflating it.
- Never exceed the inflation pressures specified for the tire. Always check the tire pressure of tires on both sides of the machine.



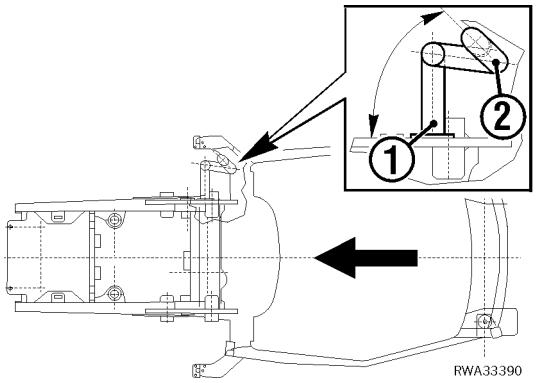
RWA01680

EXHAUST SYSTEM PRECAUTION

The exhaust pipe (1) and tail pipe (2) remain very hot immediately after turning the engine off. If the exhaust pipe or tail pipe need servicing, wait until they cool off before attempting repairs, or you will become burned.



When reassembling the tailpipe (2) to the exhaust pipe (1), position the tail pipe (2) as shown in the illustration at right. This step prevents exhaust gases from entering the cab.



HYDRAULIC OIL ENVIRONMENTAL ESTER SYNTHETIC (HEES)

HEES is a synthetic, biodegradeable oil intended for use in the hydraulic system only.

NEVER:

- use HEES in the: engine, transmission, axle, braking system.
- mix HEES with organic hydraulic oil. Doing so could clog the hydraulic oil filter.

When switching to HEES for the hydraulic system:

1. Drain the organic oil from the tank completely.
2. Disconnect the hydraulic lines and drain the oil from the lines and the cylinders.
3. Replace the hydraulic oil filter with a new one.
4. Reconnect the hydraulic oil lines.
5. Fill the hydraulic oil tank with HEES type oil.
6. Start the engine and let it idle until the hydraulic oil is 40° C (104° F).
7. Operate all the work equipment to fill the hydraulic circuits.
8. Stop the engine and check the hydraulic oil level. Add oil as needed.

After completing the conversion to HEES, change the hydraulic oil after 1,000 hours of operation. Thereafter, change the hydraulic oil every 2,000 hours of operation.

CRITICAL PARTS

Periodically, some parts must be replaced for safety purpose. Although parts may seem in good condition, they may fail at a future point, injuring the operator or an innocent passerby. Listed are some of the systems containing these components that may fail in extended use:

- Fuel supply and delivery hoses.
- Hydraulic system: main delivery hoses and tubing.
- Hydraulic hoses: all the hoses that feed and return the hydraulic fluid to and from the work equipment.

VIBRATIONS TO WHICH THE OPERATOR IS EXPOSED

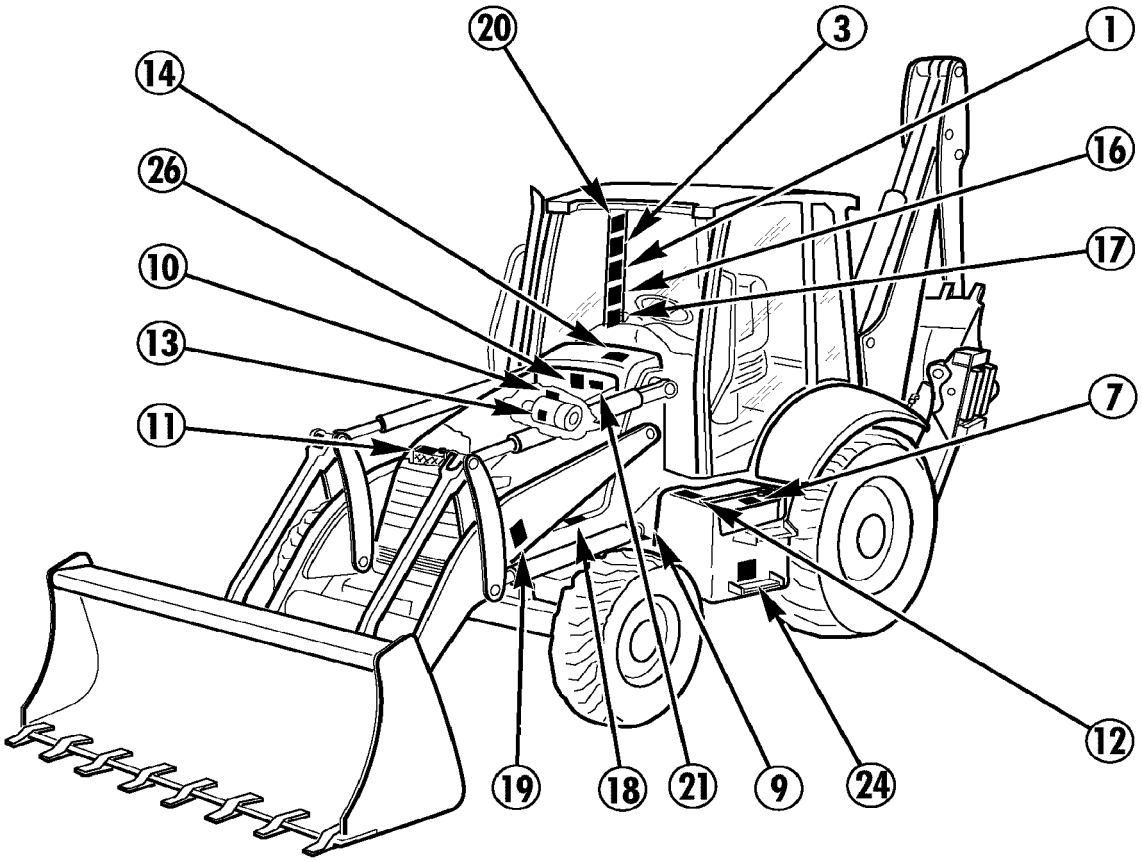
Machine vibrations are transmitted to the operator. The upper limbs are subjected to fewer than 2.5 m/sq.sec. (8.2 ft/sq.sec.) vibrations. The seated part of the body is subject to vibrations lower than 0.5 m/sq (1.7 ft/sq.sec.).

SAFETY AND WARNING DECALS

It is important that all safety and warning decals are in place, not damaged, not covered up, and not removed. It is also important for the operator to be aware of the decal content and location.

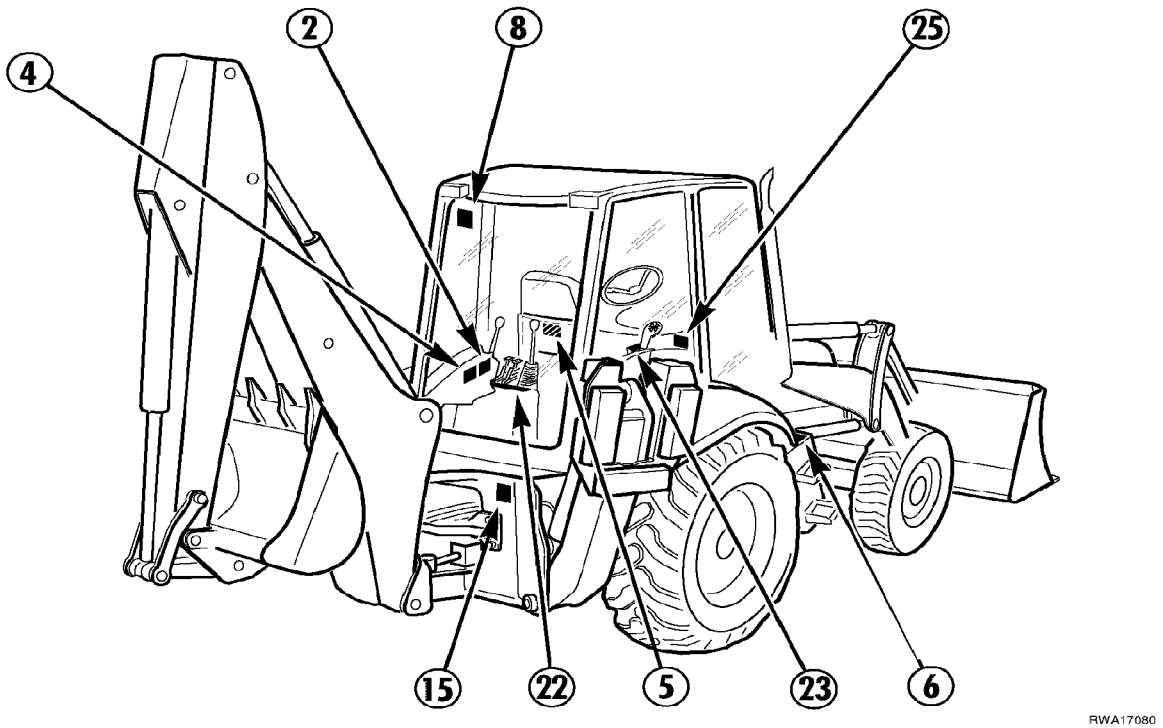
SAFETY DECAL LOCATIONS

- Your Komatsu Dealer can supply new replacement decals, if the ones on the machine are damaged or missing.
- When replacing damaged or missing decals, be sure they are placed in the proper location.
- Additional safety or warning decals may be added to your machine, if desired.

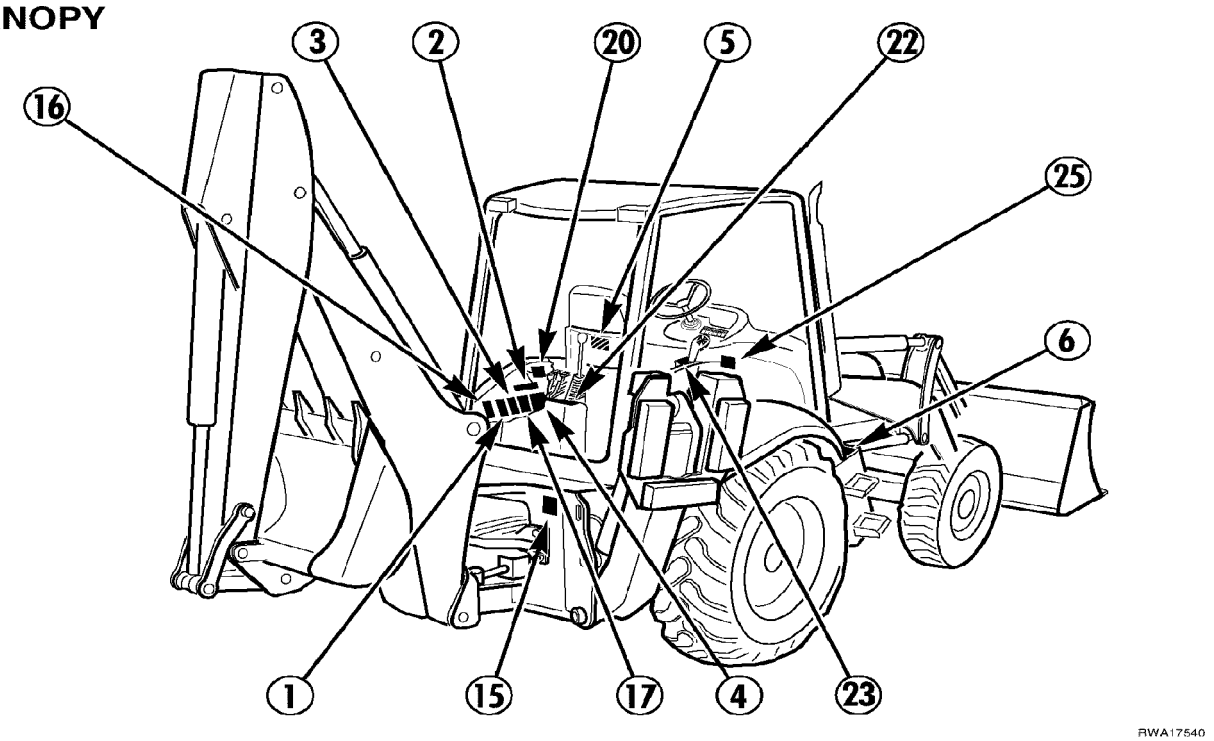


RWA17070

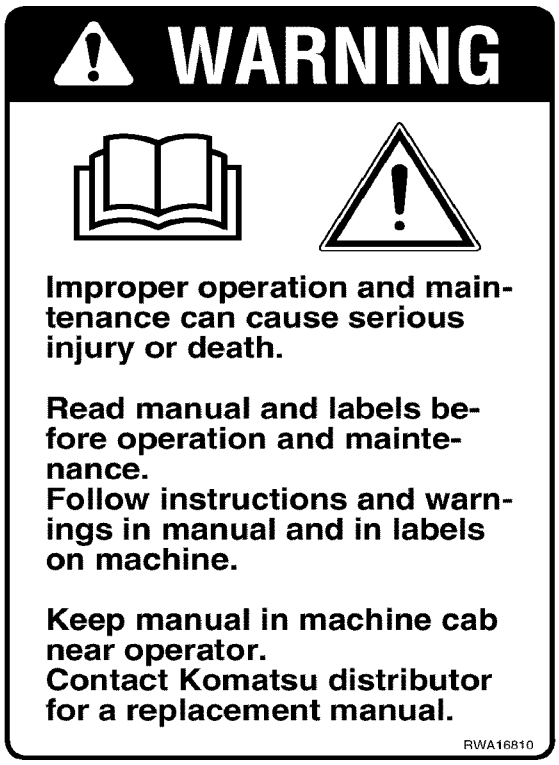
CAB



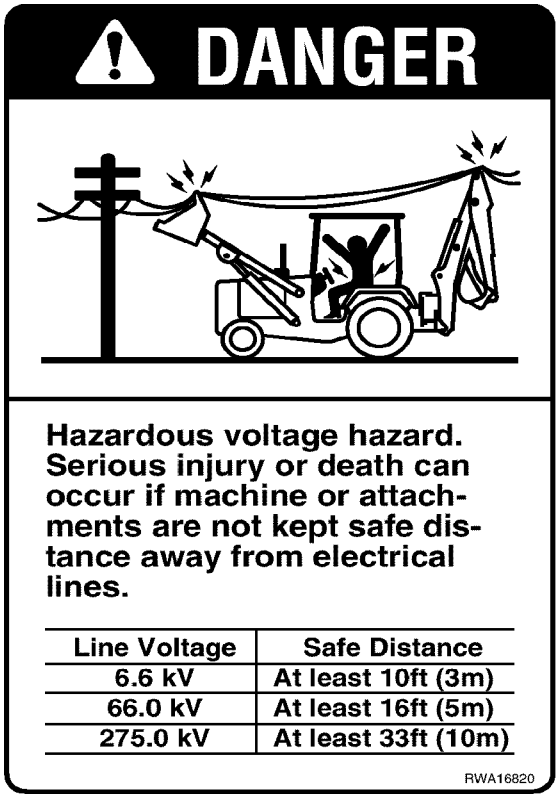
CANOPY



1. **WARNING**
   BEFORE OPERATING THIS MACHINE:
   - Study the operator's manual.
   - Be aware of all the safety decals.
   - Keep the operator's manual with the machine at all times for reference.



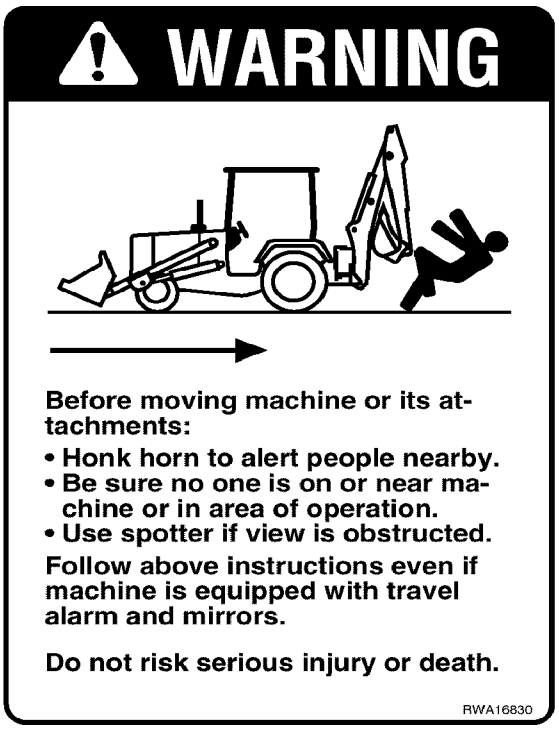
2. **DANGER**
   HIGH-VOLTAGE HAZARD
   The backhoe boom is 1m (3 ft) above the canopy when the machine is in the travel posture and can hit the power lines. And the bucket, if raised, can also hit the power lines.



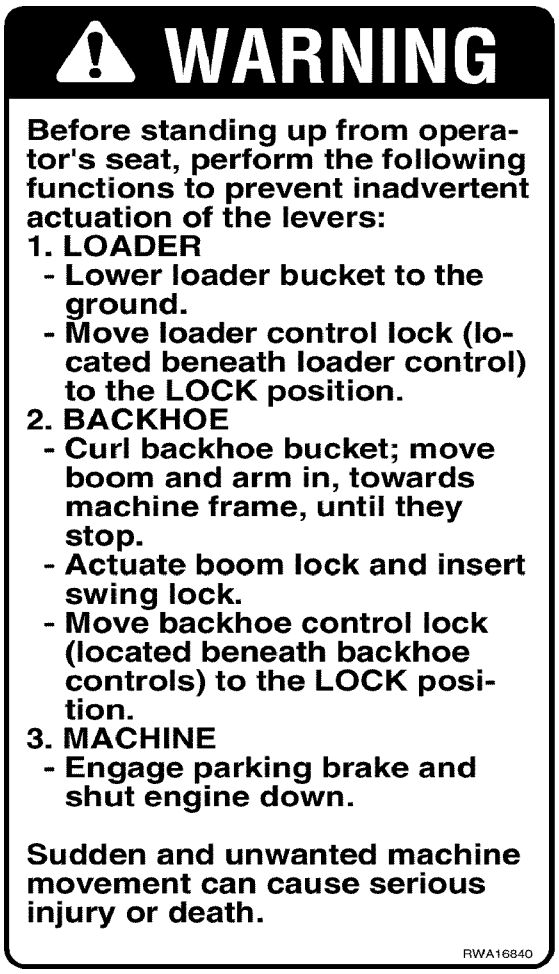
3. WARNING

BEFORE MOVING MACHINE OR ITS ATTACHMENTS

- Be sure that all personnel are at least 12 m (40 ft) away from any point on the machine before moving the machine.
- Never allow anyone to stand near the machine while in operation.
- Remember, the larger the machine the more restricted your visibility will be.

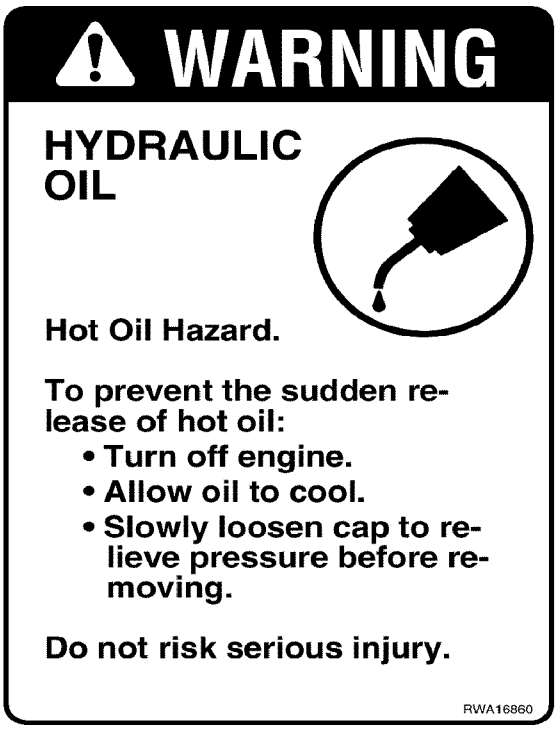


4. **WARNING**
SHUT DOWN PROCEDURES
- Lower the loader to the ground.
- Lock the loader controls.
- Curl the bucket and move the arm in towards the frame until they stop.
- Activate the boom lock and insert the travel pin.
- Lock the backhoe controls.
- Engage the parking brake.



5. **DANGER**
DO NOT OPERATE
Keep this warning tag with the machine at all times. Display the tag when performing maintenance or repairs.

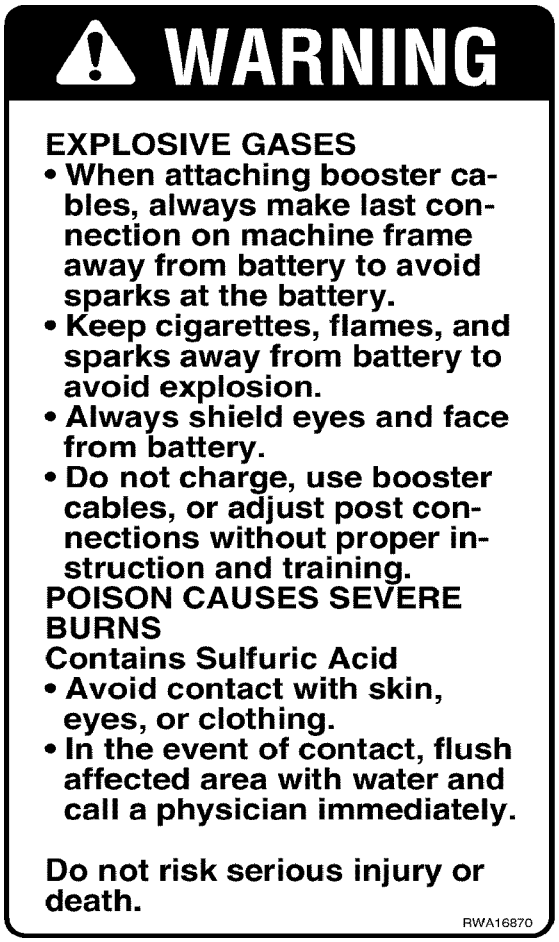
6. **WARNING**
HOT OIL HAZARD.
   - Turn the engine OFF.
   - Allow the oil time to cool down.
   - Slowly loosen the cap to relieve pressure before removing.



7. WARNING

BATTERY SAFETY PRECAUTIONS

- When attaching booster cables, always make the negative (-) connection last and at a remote location away from the battery.
- Do not smoke, allow open flames, or sparks near battery.
- Always ware a face shield when working with batteries.
- When charging the battery always follow proper charging instructions outlined in the “Service Manual” for this machine.
- Avoid contact with battery acid. Sulfuric Acid may cause burns or damage clothing or components.
- If you should come in contact with battery acid or spill some, flush the area immediately with water.

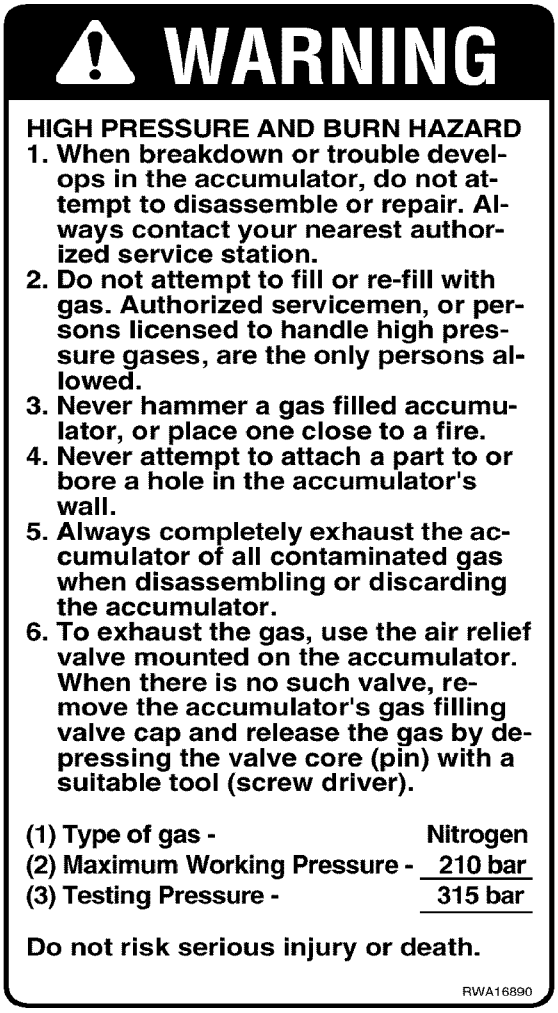


8. WARNING

WINDOW LOCKS

Be sure the window is in the locked position to avoid sudden and unexpected movement.

9. **WARNING**
ACCUMULATOR
- When releasing the pressure or charging with gas for the work equipment circuit of machines equipped with an accumulator, be careful and follow the instructions given for handling the accumulator.
- The accumulator is charged with high-pressure nitrogen gas which is extremely dangerous. Read the following items and be careful to handle the accumulator properly.
- Do not make any holes or bring any open flames or heat close to the accumulator.
- Do not weld on the accumulator.
- Release the gas must before disposing of the accumulator. Ask your distributor to do this job.



10. **IMPORTANT**
AIR FILTER
- Keep element free of damage or oil deposits.
- Do not use oil on this filter element.

11. WARNING
HOT COOLANT HAZARD
- Turn the engine OFF
- Allow the engine cooling system time to cool down.
- Slowly loosen the radiator cap to relieve pressure before removing it.

12. FUEL
DIESEL FUEL ONLY
- If the fuel tank should need draining, refer to the "Maintenance Manual" for proper procedures.

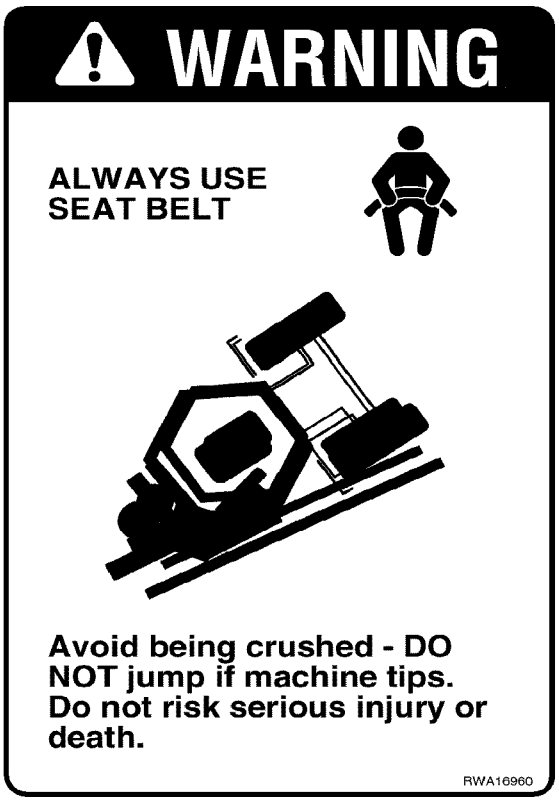
13. DANGER
DO NOT USE ETHER
- Using ether may cause explosion or damage the engine.

14. WARNING
ENGINE RUNNING
- Keep away from rotating or moving engine parts.
- Keep clear of the engine fan and fan belt.

15. DANGER
PINCH POINT
- Operate the machine from the operator's seat only.
- During operations, never place any part of your body near the swing area of the machine.

16. WARNING
SEAT BELT USE

- While operating the machine, the operator remain within the rollover protective structure, and the seat belt fastened snugly around the waist.



17. **WARNING**
BLOCK WHEELS

- Always block the wheels when parking on an incline.

18. DANGER

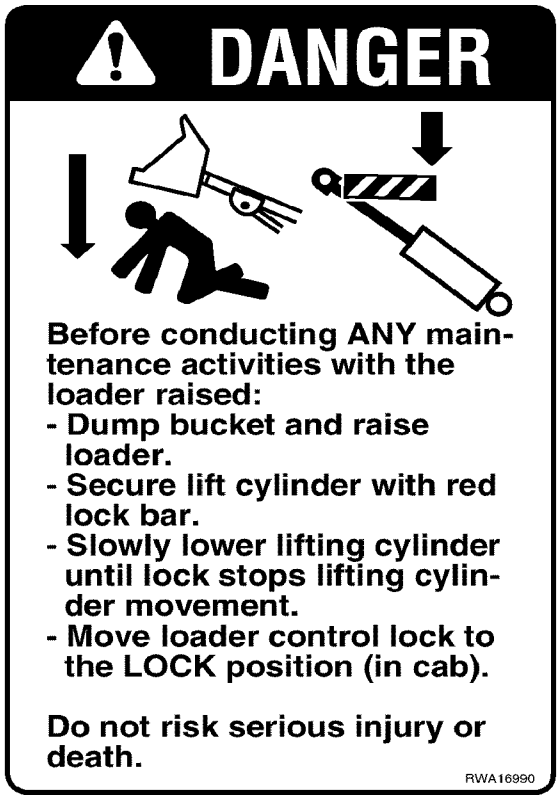
DO NOT TAMPER WITH STARTER

- Never bypass the starting circuit by jump starting your machine at the starter or any other point outside of the operator's cab.
- Start the machine from within the operator's cab only.

19. DANGER

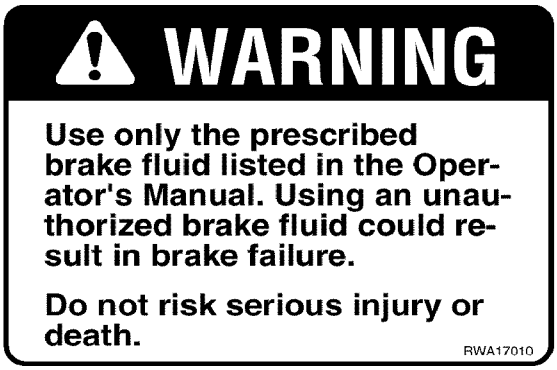
BEFORE PERFORMING ANY MAINTENANCE WITH THE LOADER RAISED

- Empty the bucket completely.
- Raise the loader and install the safety bar.
- Slowly lower the loader cylinder until all movement stops.
- Lock the loader controls.

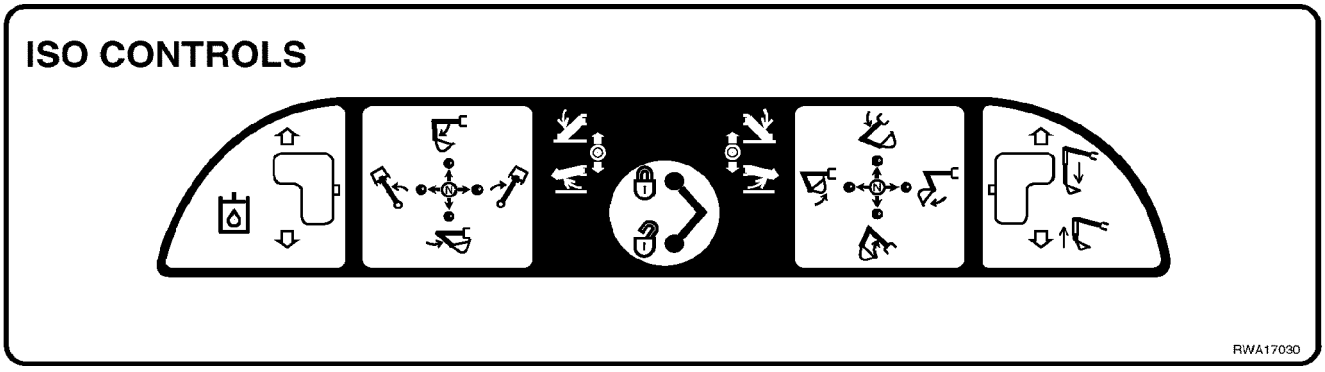


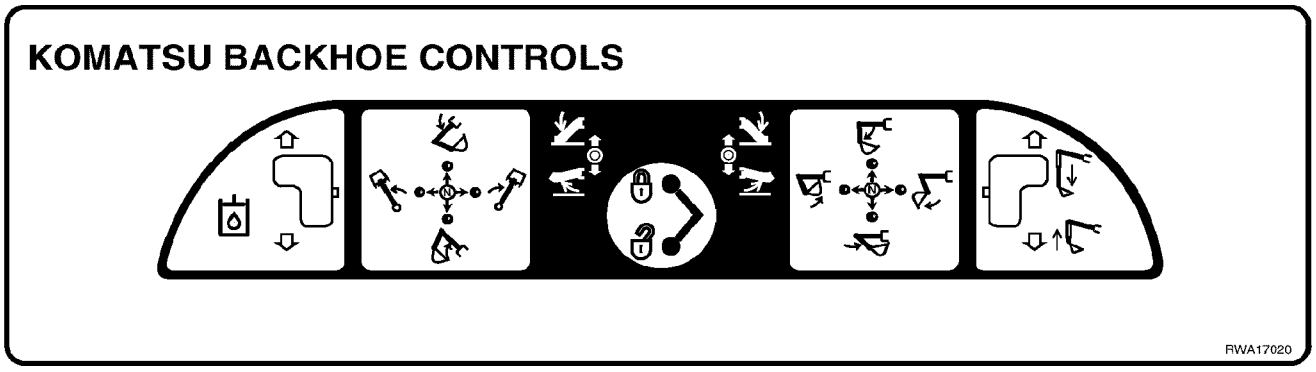
20. CAUTION
DO NOT WELD ONTO ROPS STRUCTURE

21. WARNING
BRAKE FLUID
Use only the specified brake fluid for the hydraulic braking system. Using the wrong brake fluid may lead to brake failure.



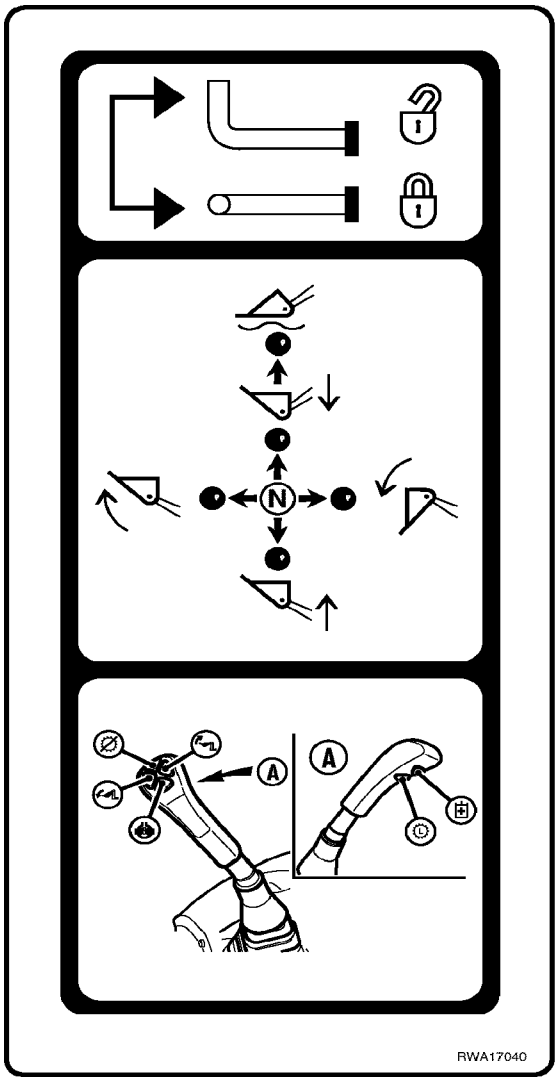
22. BACKHOE LEVERS OPERATION





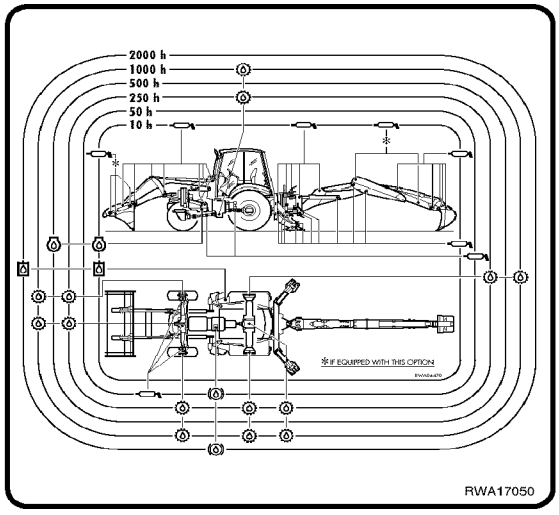
23. LOADER LEVER CONTROL

- Loader lever lock.
- Bucket positions.
- Switch functions.

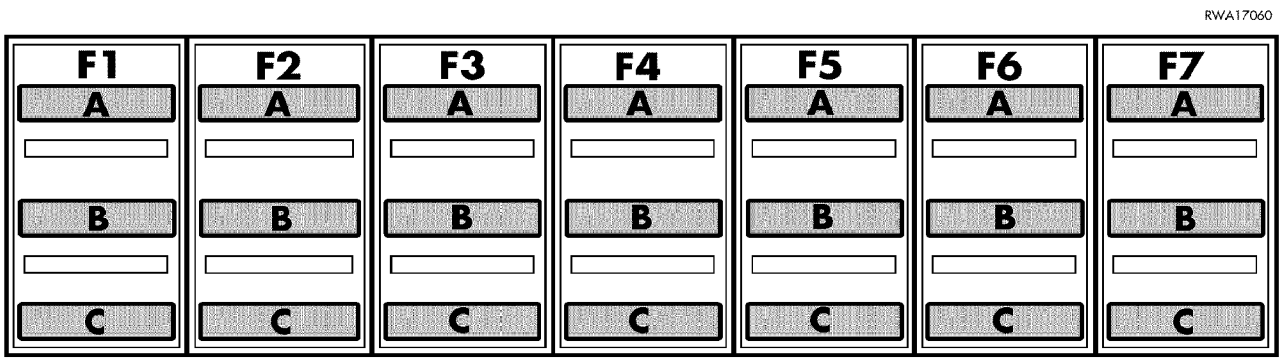


24. LUBRICATION

- Lubrication time intervals.
- Lubrication points.

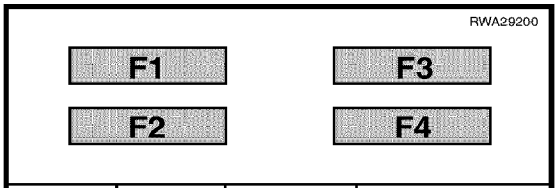


25. EQUIPMENT FUSE DECAL



POSITION		COLOR	CAPACITY (A)	LED n°	INVOLVED CIRCUIT
F1	A	Light blue	15	DL28	Low beam
	B	Violet	3	DL8	Rear right and front left parking light
	C	Violet	3	DL7	Rear left and front right parking light
F2	A	Red	10	DL10	Electric lighter
	B	Brown	7.5	DL11	Cab overhead lamp - Radio
	C	Red	10	DL12	Emergency power supply
F3	A	Brown	7.5	DL3	Start enabling
	B	Brown	7.5	DL13	Instruments - Switch lights
	C	Brown	7.5	DL27	Optional equipment solenoid valve
F4	A	Brown	7.5	DL14	Differential lock solenoid valve
	B	Red	10	DL15	Direction selector
	C	Light blue	15	DL29	High beam
F5	A	Light blue	15	DL17	Heating
	B	Light blue	15	DL18	Rear working lights
	C	Light blue	15	DL19	Front working lights
F6	A	Light blue	15	DL20	Windshield wiper - Revolving light
	B	Brown	7.5	DL21	Dimmer switch - Horn relay
	C	Red	10	DL22	Direction indicators
F7	A	Brown	7.5	DL23	Monitor (if provided)
	B	Red	10	DL24	Horn
	C	Brown	7.5	DL25	Alternator excitation - Engine stop solenoid

26. ENGINE FUSES



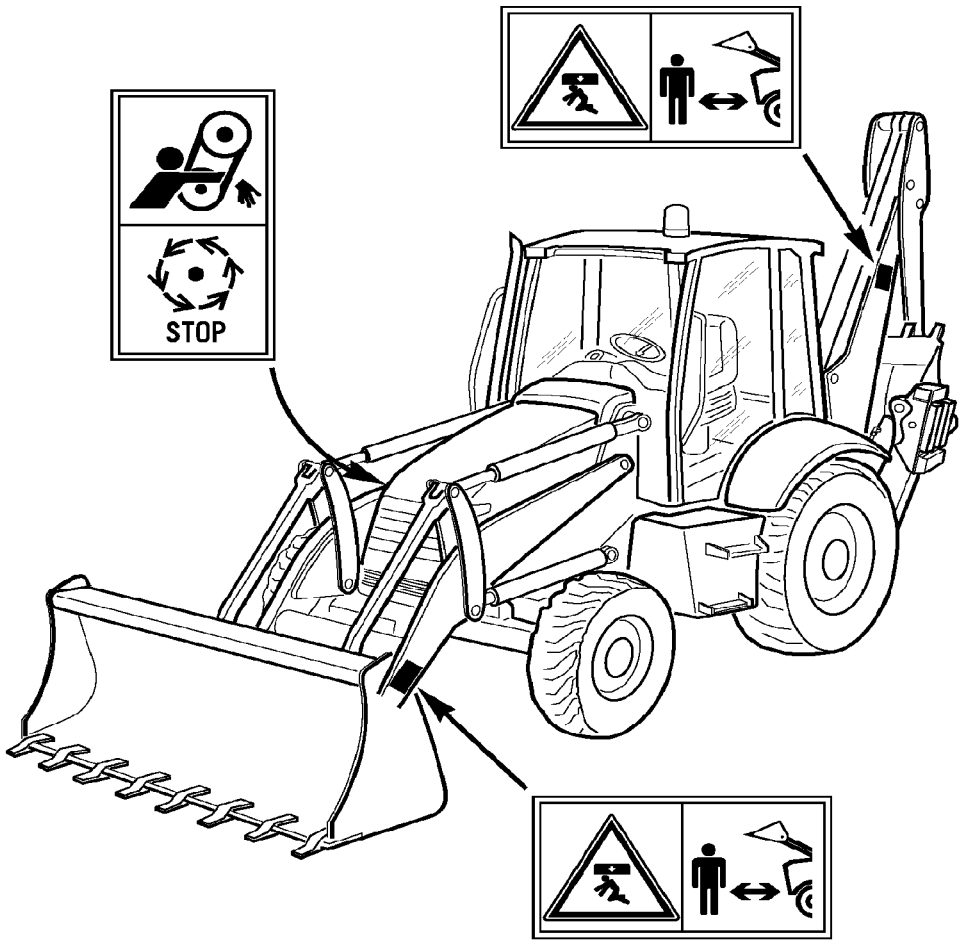
POSITION	COLOR	CAPACITY (A)	INVOLVED CIRCUIT
F1	White	80	Glow plug preheating
F2	Green	30	Engine stop
F3	Blue	60	Engine start
F4	White	80	Alternator

OTHER DECALS

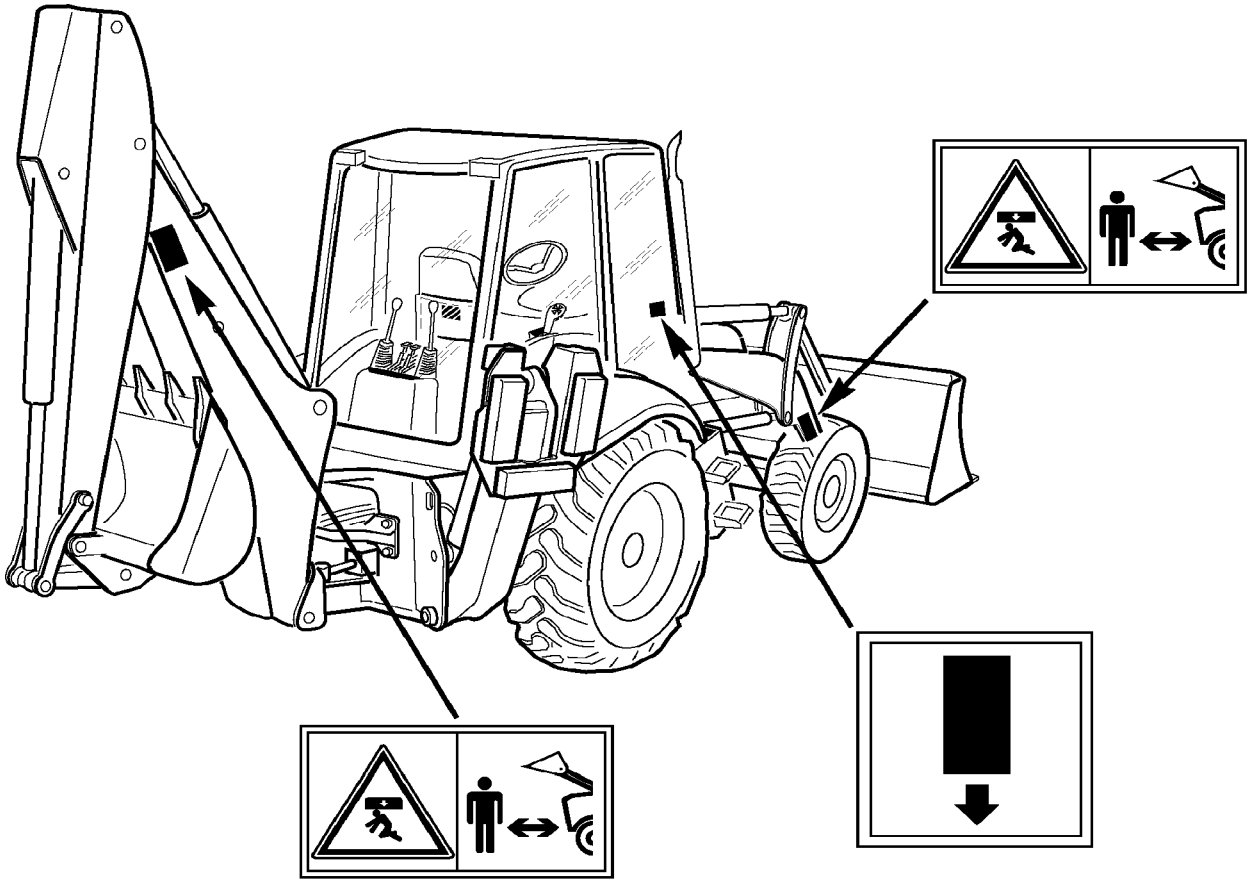
Besides the safety and warning decals, other decals exist that are equally important and also pertain to safety.

- Your Komatsu Dealer can supply new decals, if the ones on the machine are damaged or missing.
- When replacing damaged or missing decals, be sure they are placed in the specified location.
- Additional safety or warning decals may be added to your machine, if desired.

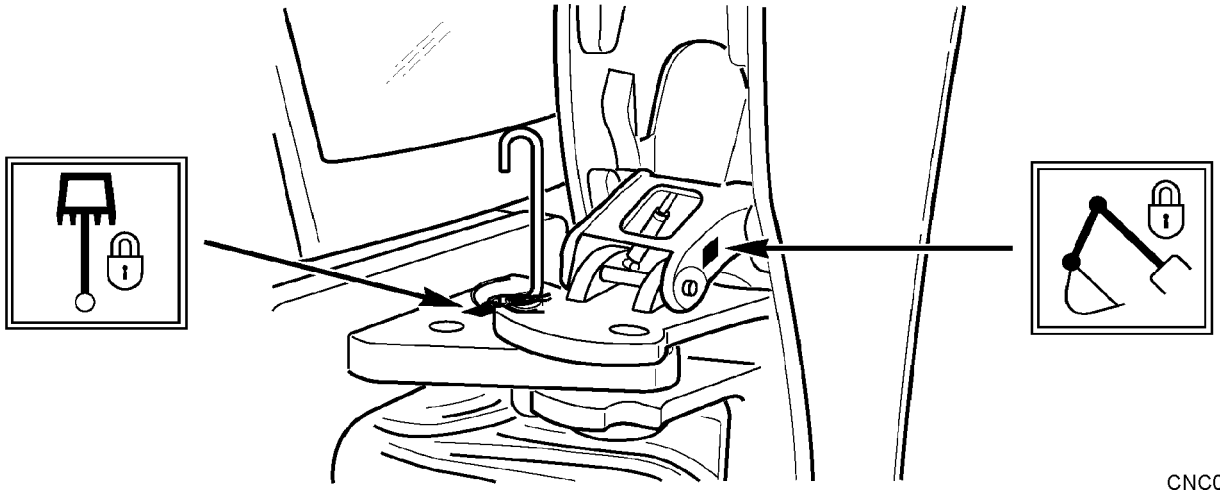
LOCATION



CNC0008



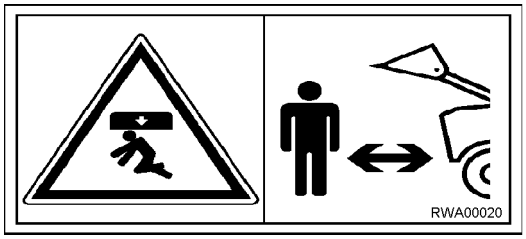
CNC0009



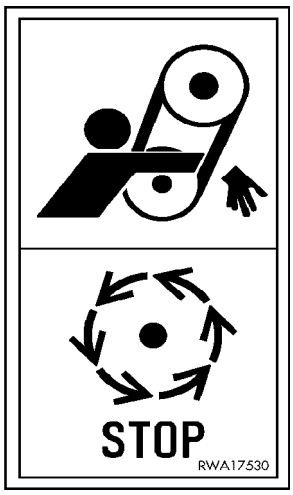
CNC0010

DECALS DEFINED

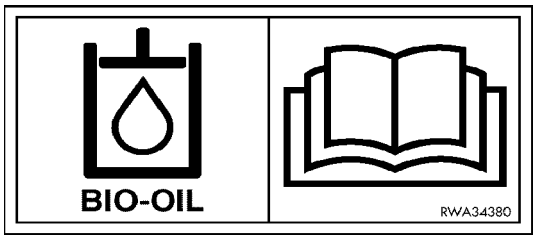
DANGER IN THE WORK AREA
Do not approach or stand near the work equipment operating radius when the loader is raised.



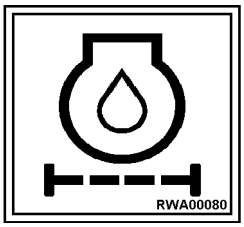
MOVING PARTS IN ENGINE COMPARTMENT
Keep clear of moving parts inside engine compartment.



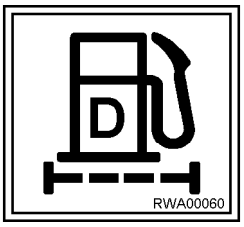
FILL THE SYSTEM WITH HEES TYPE OIL
HEES is a synthetic, biodegradeable type oil that is used only in the hydraulic oil tank.



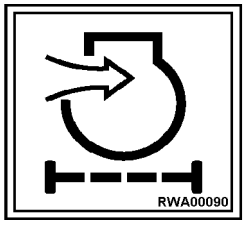
ENGINE OIL FILTER



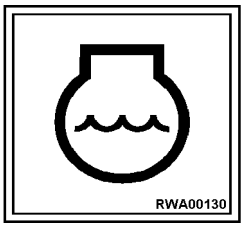
FUEL FILTER



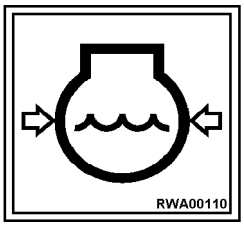
ENGINE AIR FILTER



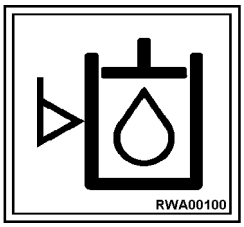
ENGINE COOLANT



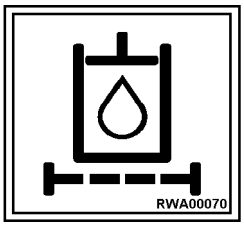
ENGINE COOLANT PRESSURE



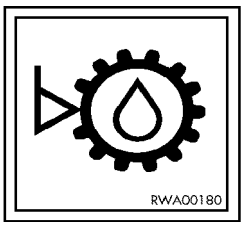
HYDRAULIC OIL LEVEL



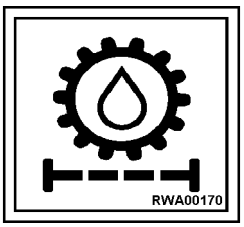
HYDRAULIC OIL FILTER



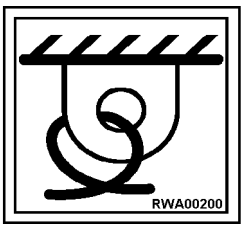
TRANSMISSION OIL LEVEL



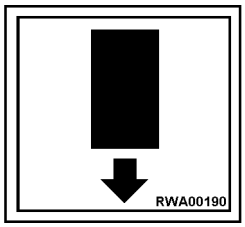
TRANSMISSION OIL FILTER



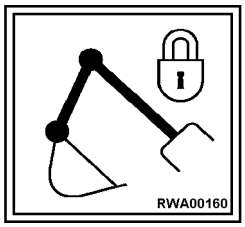
ANCHOR POINT



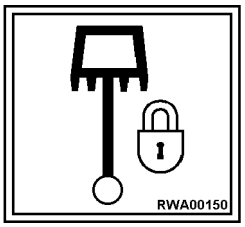
EMERGENCY EXIT



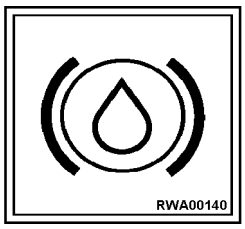
BOOM LOCK



SWING LOCK



BRAKE FLUID



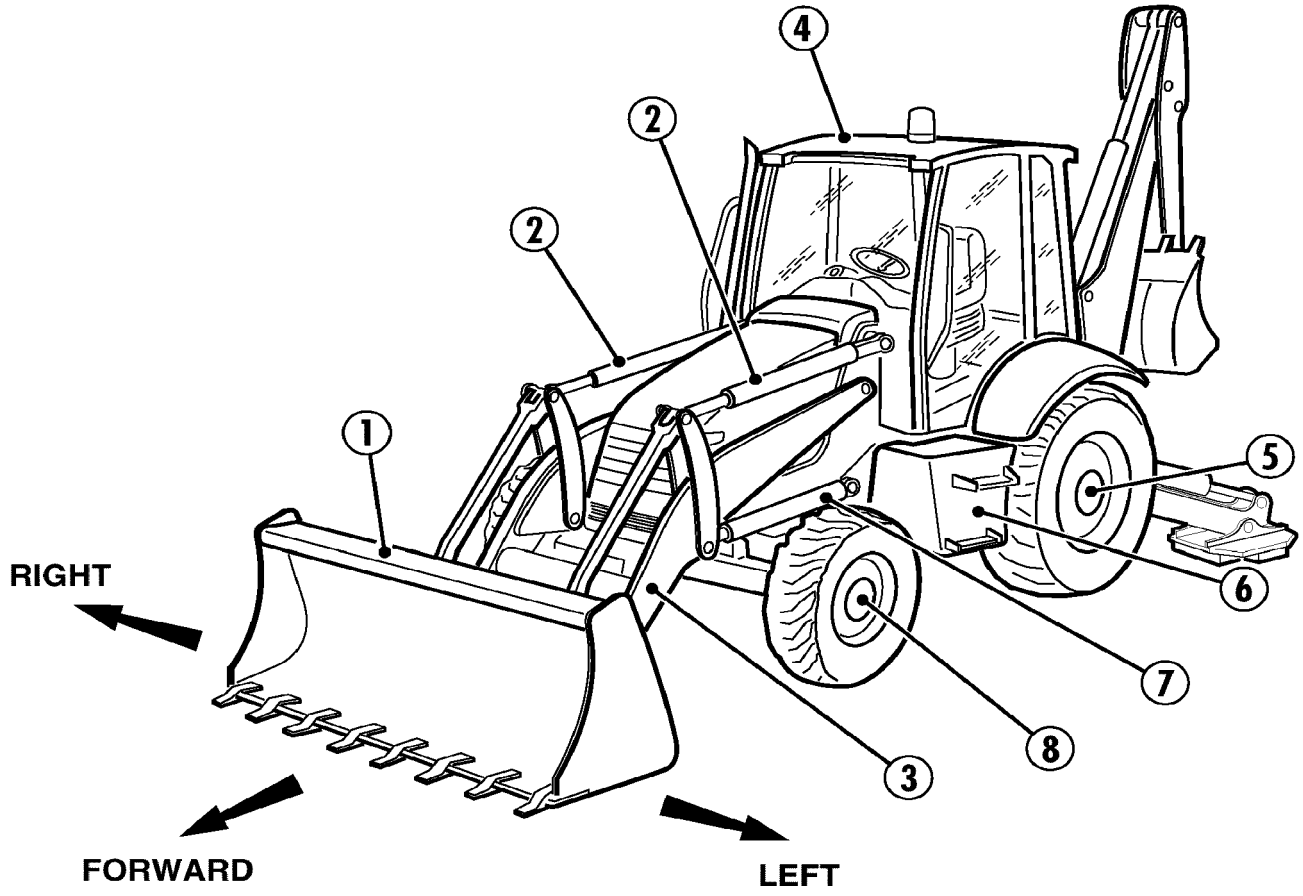
OPERATION

GENERAL VIEW OF MACHINE

The directions of left and right depends if using the loader or the backhoe.When operating the loader or travelling, the operator faces the front of the machine. When operating the backhoe, the operator faces the rear of the machine. Keep in mind that left and right change from front view to rear view.

FRONT VIEW OF MACHINE

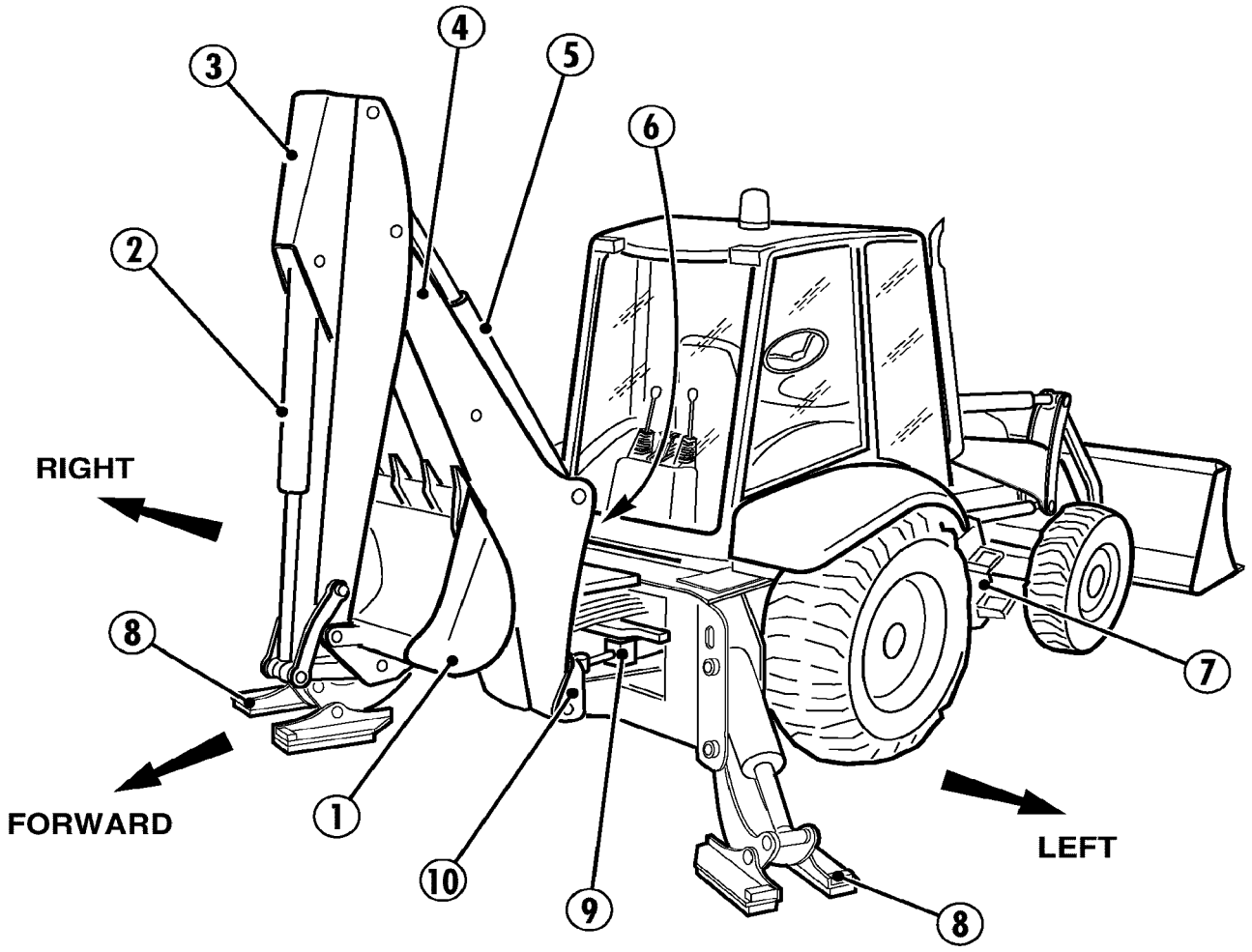
RWA04400



1. Front Bucket	5. Rear Axle
2. Bucket Cylinder	6. Fuel Tank
3. Bucket Arms	7. Lift Cylinder
4. Cab	8. Front Axle

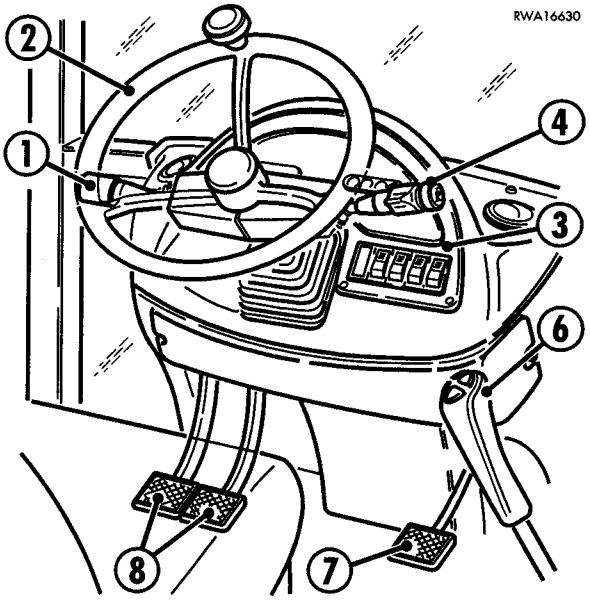
REAR VIEW OF MACHINE

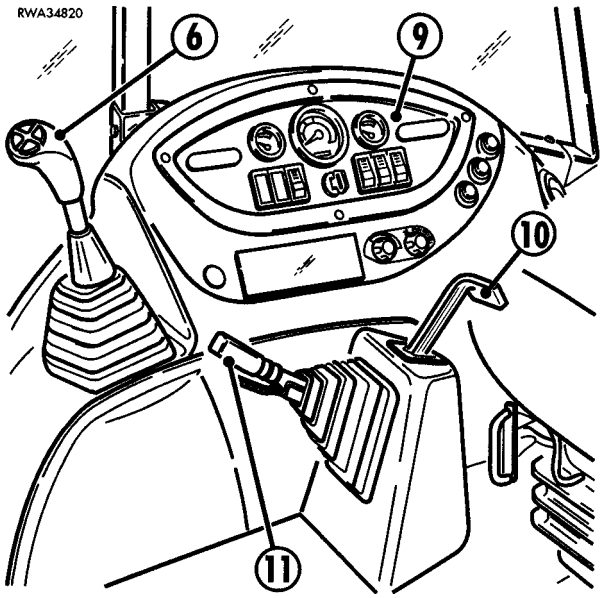
RWA04490



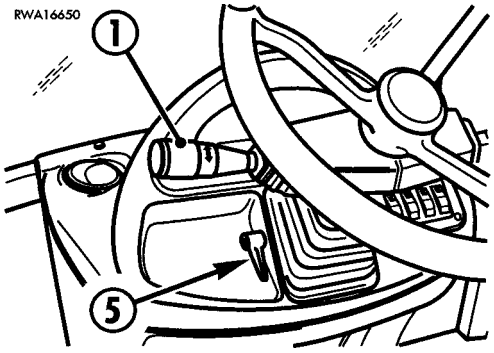
1. Bucket
2. Bucket Cylinder
3. Arm
4. Boom
5. Arm Cylinder
6. Boom Cylinder
7. Hydraulic Oil Tank
8. Outriggers
9. Boom Swing Cylinders
10. Boom Support Boss

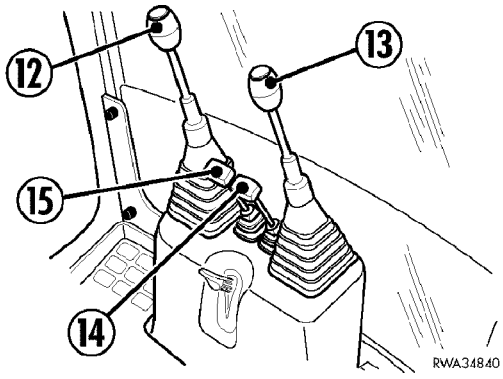
MACHINE CONTROLS



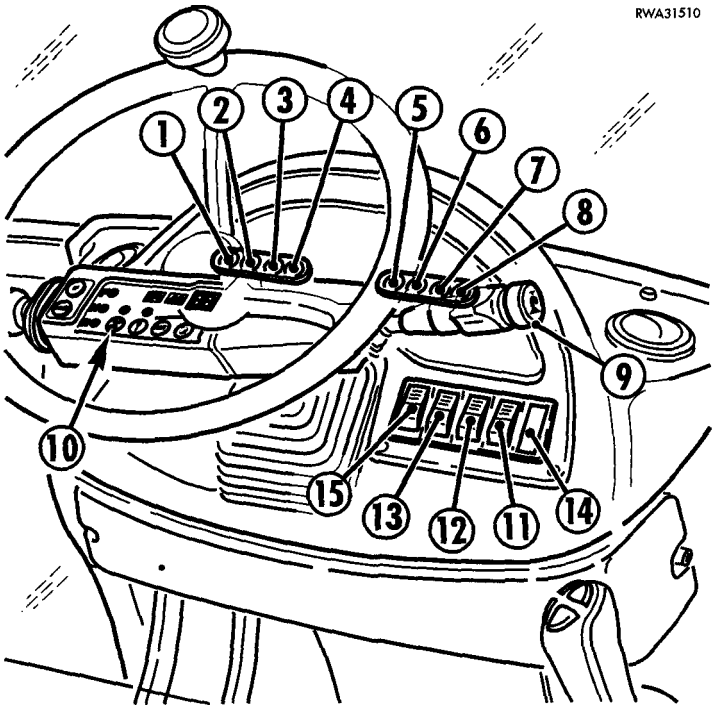


1. Gearshift lever
2. Steering wheel
3. Front dashboard
4. Turn signal-dimmer switch
5. Steering wheel adjustment lock (optional)
6. Loader control lever
7. Accelerator pedal
8. Brake pedals
9. Side dashboard
10. Hand accelerator
11. Parking brake
12. Arm and swing control lever (ISO controls)
    Boom and swing control lever (Komatsu backhoe controls)
13. Boom and bucket control lever (ISO controls)
    Arm and bucket control lever (Komatsu backhoe controls)
14. Right stabilizer control lever
15. Left stabilizer control lever





FRONT INSTRUMENTS AND CONTROLS



1. Transmission oil temperature alert
2. Engine coolant temperature alert
3. Four-wheel drive indicator light
4. Low fuel alert
5. Directional signal indicator
6. High beam indicator
7. Parking brake/low brake fluid alert
8. Differential LOCK/UNLOCK light
9. Multifunction/directional switch
10. Four-wheel drive push button
11. Windshield wiper/washer switch
12. Front work lamps switch
13. Emergency/Hazard lights switch
14. Optional switch locations
15. Electric safety valve switch (optional)

TRANSMISSION OIL TEMPERATURE ALERT

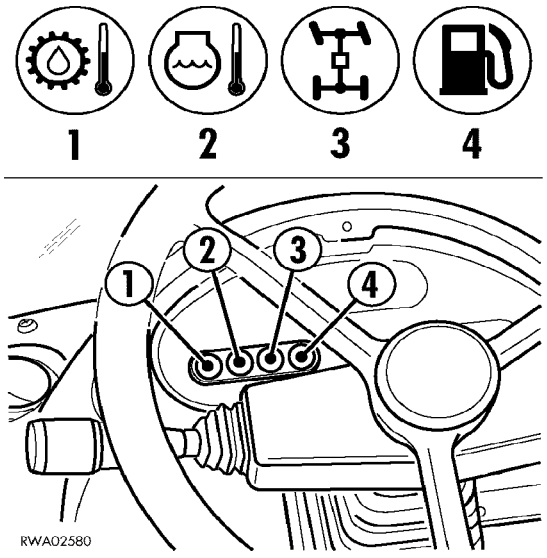
This warning light (1) glows and an audible alarm sounds when the transmission oil overheats. If this light and alarm come on, immediately stop the machine and select neutral gear. Let the transmission oil cool down with the engine running at about 1,200 RPM until the alarm stops. If the alarm and warning light come on frequently, have the machine checked by an authorized Komatsu dealer. Do not continue to operate the machine.

ENGINE COOLANT TEMPERATURE ALERT

This warning light (2) glows and an audible alarm sounds when the engine overheats. If this light and alarm come on, immediately stop the machine and select neutral gear. Let the engine run at about 1,200 RPM until the alarm stops. If the engine continues to overheat or occurs frequently, have the machine checked by an authorized Komatsu dealer.

FOUR-WHEEL DRIVE INDICATOR

When four-wheel drive (3) is selected, this indicator light glows to indicate the four-wheel drive system is engaged. When the indicator light is off, the four-wheel drive system is disengaged.

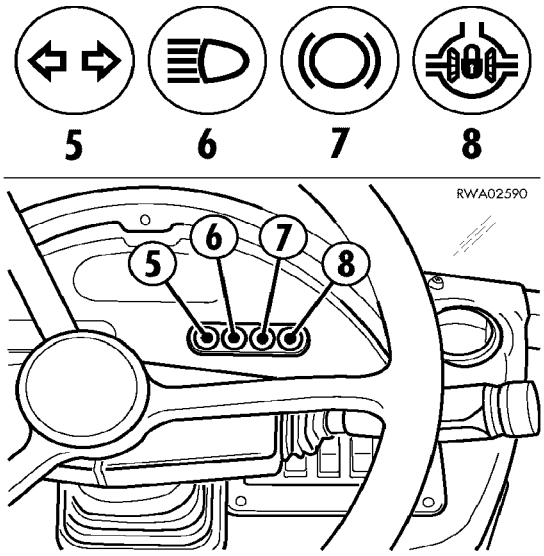


LOW FUEL ALERT

This warning light (4) comes on when there is about 17 liters (4.5 gal) of fuel left in the fuel tank. Refuel the machine as soon as possible. Avoid running the machine out of fuel. Damage to the fuel injectors may result, if attempting to restart the engine after the fuel runs out.

DIRECTIONAL SIGNAL INDICATOR

A left or right turn indicator light (5) flashes when the multifunctional directional switch (9) is pushed up or down. Both the left and right turn indicator lights flash when the emergency/hazard switch (13) is engaged.



HIGH BEAM INDICATOR

This indicator light (6) comes on when the high beam is actuated by the multifunctional directional switch (9). When the multifunctional directional switch is actuated again, the high beam is turned off.

PARKING BRAKE/LOW BRAKE FLUID ALERT

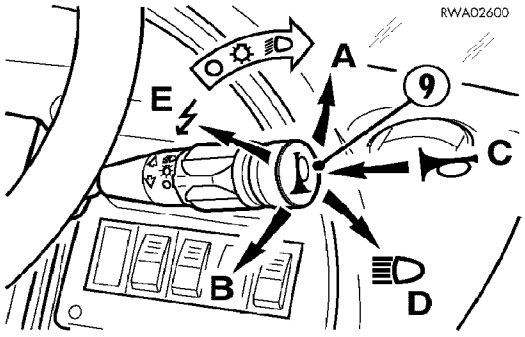
This warning lamp (7) indicates the parking brake is applied or the brake fluid level is low. This light should glow when the parking brake is set and go off after releasing the parking brake. If this warning lamp glows intermittently during operation or remain on after start-up, do not operate the machine. Have the braking system checked by an authorized Komatsu dealer.

DIFFERENTIAL LOCK/UNLOCK INDICATOR

The indicator lamp (8) glows when the differential lock is engaged. When the indicator lamp is off, the differential is unlocked. This feature is controlled by a button in the loader control handle.

MULTIFUNCTIONAL DIRECTIONAL SWITCH

This switch (9) controls five functions:



A. Left turn signal

B. Right turn signal

C. Horn

D. High/Low headlight beams

E. Flash headlights

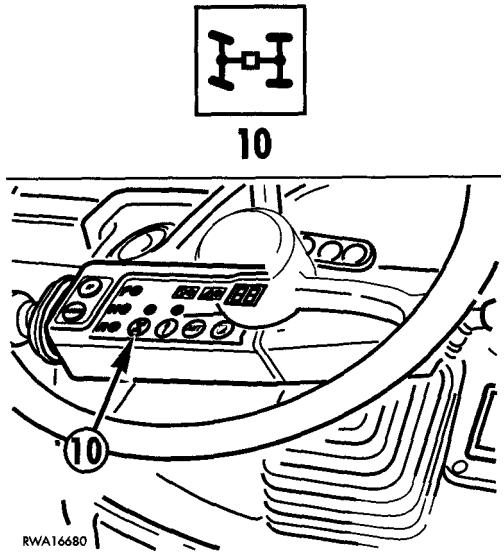
FOUR-WHEEL-DRIVE SWITCH

Pressing this switch (10) engages the four-wheel drive and the indicator light (3) glows. When the switch is pressed again, the four-wheel drive is disengaged and the indicator light (3) turns off.

However, the four-wheel drive will automatically engage when the service-brake pedals are pressed while in 4th gear. The combined action of automatically engaging the four-wheel drive and applying the service brake reduces the stopping distance of the machine.

Remark

Do not use the four-wheel drive at high speeds or on dry roads.



WINDSHIELD WIPER/WASHER SWITCH

This switch operates the front windshield wipers and washer (11). The first switch position operates the wipers. The second switch position operates the windshield washer.

FRONT WORK LAMPS SWITCH

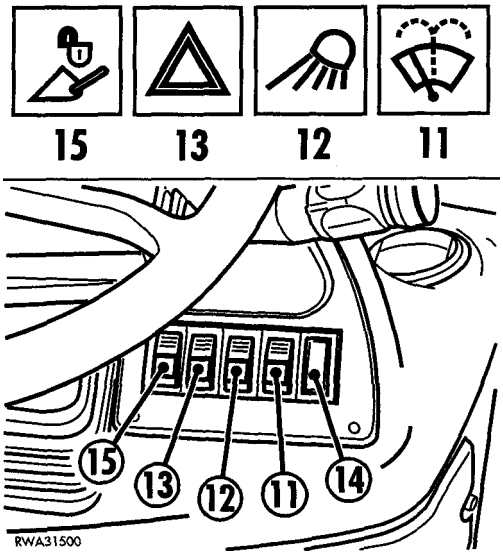
This switch (12) operates the front work lamps only.

EMERGENCY/HAZARD SWITCH

Pressing this switch (13) causes both turn signals to flash simultaneously. This feature must be used when traveling on roadways or when working in areas that need additional warnings.

OPTIONAL EQUIPMENT SWITCH

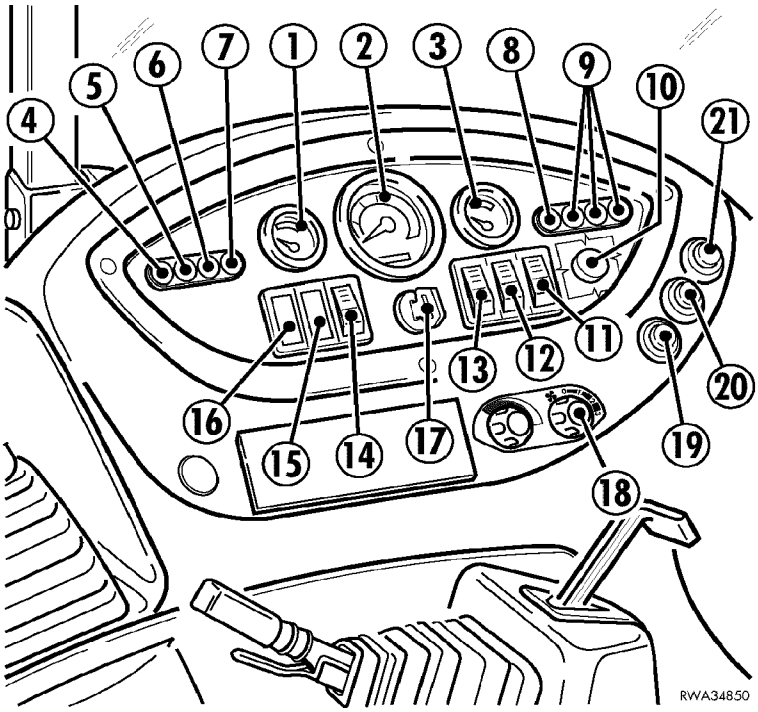
This location (14) is for any optional equipment.



ELECTRIC SAFETY VALVE SWITCH

Pressing this switch (15) deactivates the safety valves installed on the loader cylinders and a red LED turns on. Releasing this switch activates the safety valves and the red LED goes out. Turn off the electric safety valves before operating the load stabilizer system (LSS).

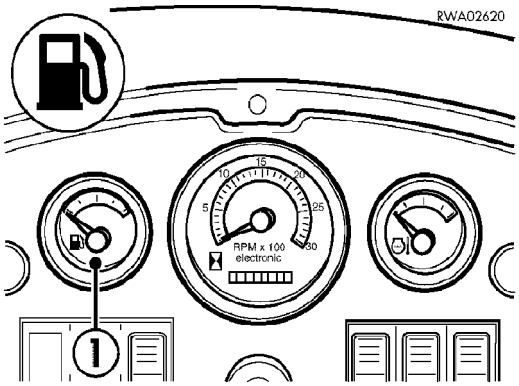
SIDE INSTRUMENTS AND CONTROLS



1. Fuel level gauge
2. RPMs and Hour Meter
3. Engine coolant temperature gauge
4. Air cleaner restriction alert
5. Engine oil pressure warning light
6. Glow plug preheating warning light
7. Charging system warning light
8. Engine coolant temperature alert
9. Optional equipment alert
10. Audible warning alarm
11. Rear work lamps
12. Windshield wiper/washer switch
13. Emergency flashing light switch
14. Rear horn
15. Load stabilizer switch (optional)
16. Air conditioner switch (optional)
17. Ignition switch
18. Blower switch
19. Backhoe speed control switch
20. Backhoe boom lock switch
21. Optional switch locations

FUEL LEVEL GAUGE

This gauge (1) will indicate the amount of fuel in the fuel tank.

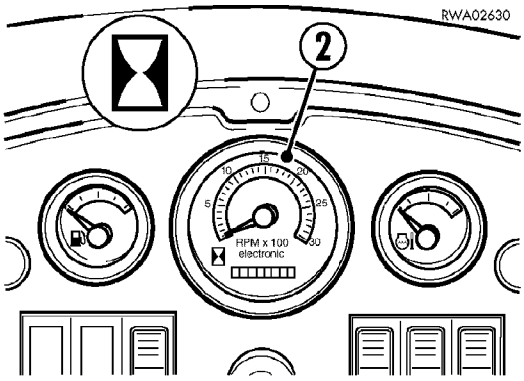


TACHOMETER AND HOUR METER

This gauge (2) indicates the engine RPM (Revolutions Per Minute). The gauge also indicates the number of hours the engine has been running.

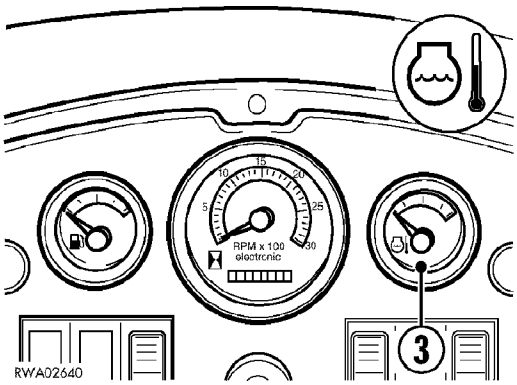
Remark

The hour meter is used to determine the maintenance intervals for the machine.



ENGINE COOLANT TEMPERATURE GUAGE

This gauge (3) indicates the engine coolant temperature. The operating range is from 80° to 85° C (176° to 185° F). Always allow the engine ample time to warm up to within the operating range before working the machine. Never allow the engine to exceed the operating temperature, or engine damage could occur.



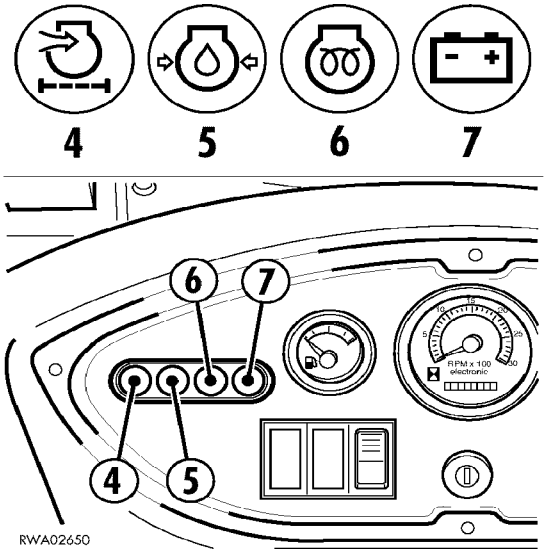
AIR CLEANER RESTRICTION ALERT

This warning light (4) comes on when the engine air filter is restricted. If this indicator light comes on during operation, shut the machine down and replace the air filter. Do not operate the machine with a restricted air filtering system, or engine damage may result.

ENGINE OIL PRESSURE ALERT

This warning lamp (5) comes on in addition to an audible alarm sounding to alert the operator of an engine oil pressure loss. Turn off the engine immediately and have the system checked by your Komatsu dealer if this light:

- comes on or comes on intermittently during operation.
- remains on after start-up.
- does not come on when the ignition key is turned to the on position.



GLOW PLUG PREHEAT INDICATOR

Before starting the engine in cold weather, the air inside the intake manifold must be preheated so the engine is able to start. For every 1° F below freezing (32° F), the air must be preheated for that many seconds. Thus, if it is 20° F, the air must be preheated for 12 seconds, the difference from 32 to 20. Turn the ignition switch to the preheat position for about 12 seconds. The indicator light (6) illuminates while the glow plug heats the air inside the intake manifold. After the light goes out, crank the engine. This procedure may have to be repeated. See "STARTING THE ENGINE IN COLD WEATHER" on page 2-39.

⚠ WARNING

Do NOT use ether to assist in cold-weather starting because of the glow plug. Damage to the engine and injury to the operator may result.

ALTERNATOR ALERT

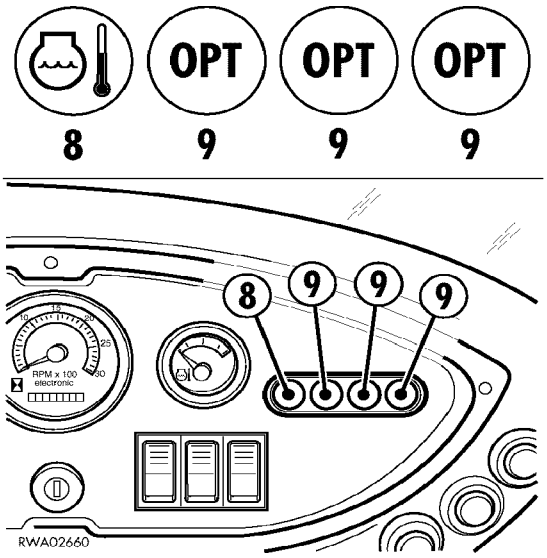
This warning light (7) comes on in addition to an audible alarm sounding to alert the operator that the battery is not charging. If this light does NOT comes on when the ignition switch is turned to the "I" position, or comes on during operation or remains on after start up, have an authorized Komatsu Dealer check the charging system.

ENGINE COOLANT TEMPERATURE ALERT

This warning light (8) glows and an audible alarm sounds when the engine overheats. If this light and alarm come on, immediately stop the machine and select neutral gear. Let the engine run at about 1,200 RPM until the warning and alarm stop. If this condition should occur again, check to make sure the radiator fins ar clean and free of debris. Do not continue to operate the machine if the engine is overheating.

OPTIONAL EQUIPMENT ALERT

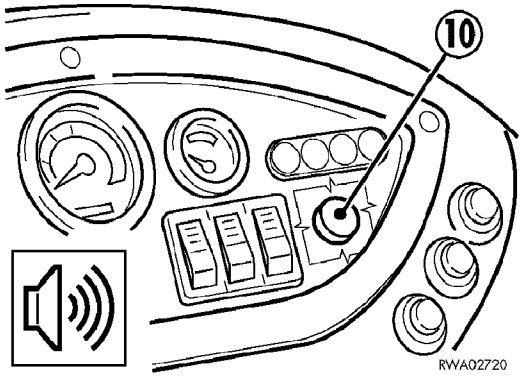
This location is for any optional equipment warning indicators (9).



AUDABLE WARNING SYSTEM

When the machine is in operation, the audible alarm (10) will sound, if the:

- Engine oil pressure is low.
- Engine is overheating.
- Transmission is overheating.
- Charging system has failed.



REAR WORK LAMPS

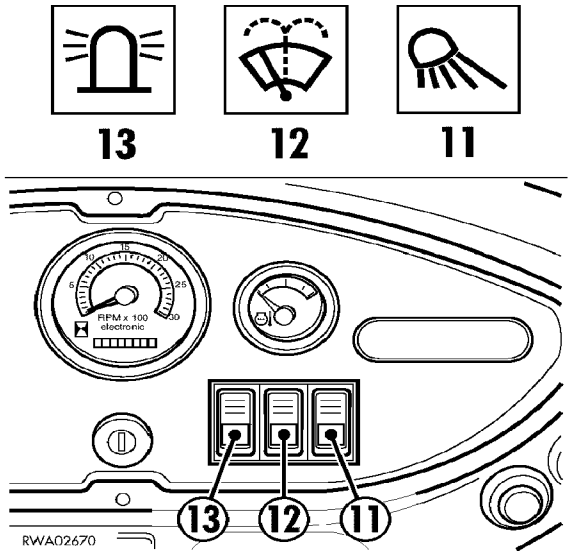
This switch (11) operates the rear work lamps. Turn off the work lamps when traveling on the road.

REAR WINDSHIELD WIPER/WASHER SWITCH

This switch (12) operates the rear windshield wipers and washer. The first position on the switch operates the wipers. The second position operates the washer.

EMERGENCY FLASHING LIGHT SWITCH

This switch (13) operates the rotating or flashing light mounted on top of the ROPS.



REAR HORN

This switch (14) activates the rear horn. This horn is to warn people in the area before you starting work operations.

LOAD STABILIZER SWITCH

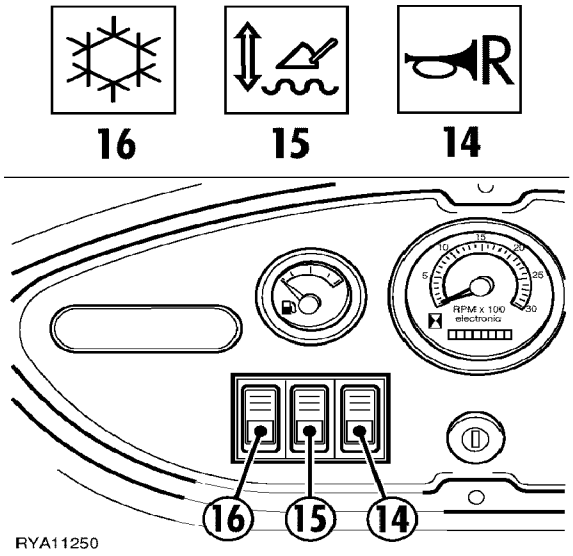
Pressing this switch (15) turns on the load stabilizing system (LSS). This feature helps stabilize the machine when the loader is full and traveling on rough ground.

Remark

Turn off the electric safety valves before operating the load stabilizer system (LSS).

AIR CONDITIONING SWITCH

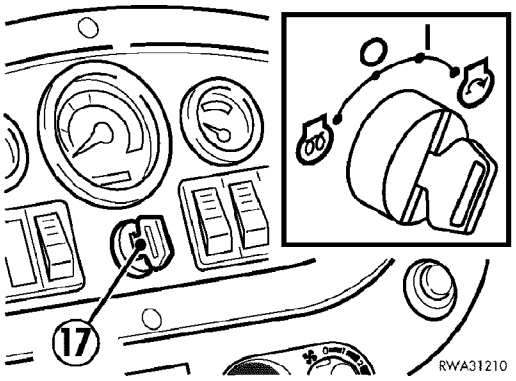
Pressing this switch (16) turns on the air conditioning system, and a green LED comes on. When the switch is off, the air conditioning system is deactivated.



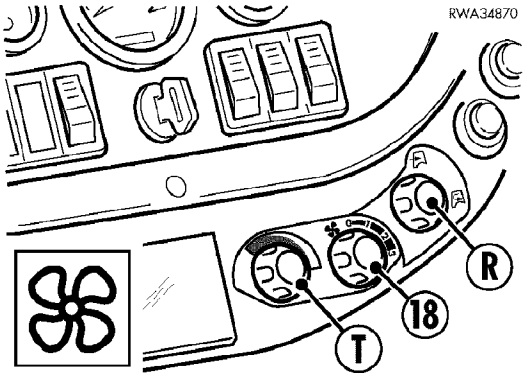
IGNITION SWITCH

The four positions of the ignition switch (17):

- Preheat
- OFF
- ON
- Start



BLOWER SWITCH

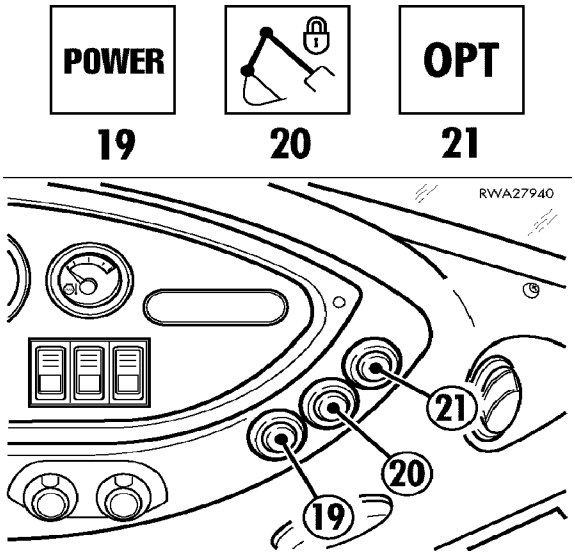


The blower switch (18) controls the blower motor operation, which has three speeds:

- Low
- Medium
- High

The temperature switch (T) adjusts the temperature of the airflow delivered inside the cab. Turning the knob clockwise increases the air temperature while turning the knob counterclockwise decreases the air temperature. The recirculation switch (R) blocks outside air from entering the cab, causing the air within the cab to recirculate. Use the recirculation feature in extreme hot or cold weather, and when working in dusty areas. Using different combinations of fan speed, temperature setting, and recirculation obtains the desired temperature within the cab.

BACKHOE POWER CONTROL SWITCH



This button (19) operates the selection of oil delivery from the hydraulic pump. Starting the machine automatically selects the POWER (switch illuminated), providing maximum power. Operating the machine in the forward or reverse gear automatically cancels the POWER mode. To return to the POWER mode, shift the gear lever to the neutral position.

Pressing the button, the backhoe goes into the economy mode, reducing power. This feature is used for excavating light material, operating optional attachments or using the backhoe for grading purpose.

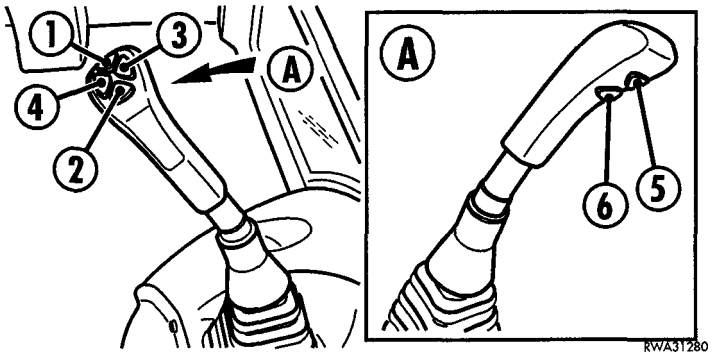
BACKHOE BOOM LOCK SWITCH

This button (20) operates the boom lock. This function holds the backhoe in the parked position, preventing hydraulic drift of the backhoe unit. Use this feature when using the loader or traveling with the machine.

OPTIONAL SWITCH LOCATIONS

This switch location (21) is for optional equipment.

LOADER CONTROLS



1 Loader declutch control button

2 Differential lock button

3 Bucket open button

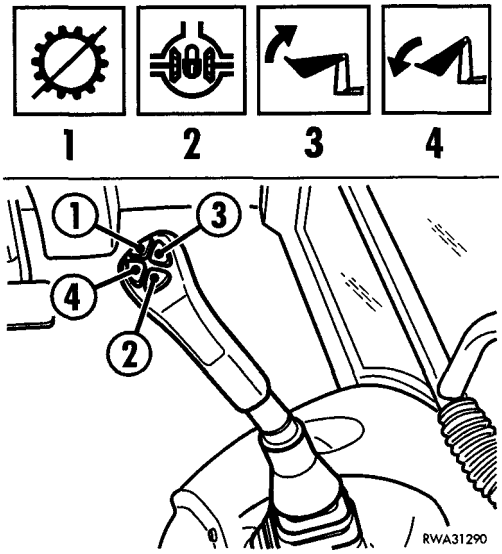
4 Bucket close button

5 Front end loader speed control button

6 Kickdown button

LOADER DECLUTCH CONTROL

Pressing this button (1) transfers all engine power from the drive line to the loader hydraulics when lifting heavy loads.This feature should only be used on level ground.



⚠ WARNING

- **Do not press this button for more than 15 to 20 seconds.**
- **Do not press this button when traveling or operating on an incline or loss of control may result.**

DIFFERENTIAL LOCK

Pressing this button (2) locks the drive axles together to prevent the wheels from spinning when operating in 1st or 2nd gear only.

⚠ WARNING

To engage the differential lock, the system must disengage the drive line. Do not use engage this feature when traveling on slopes or loss of control may result.

Remark

Engaging this feature requires that the machine is stopped or traveling at a slow speed. This function does not work in 4th gear.

BUCKET OPEN

Pressing this button (3) opens the top half of the bucket. This action converts the loader bucket into a dozer blade. Or using the bucket for picking up items.

BUCKET CLOSE

Pressing this button (4) closes the top half of the bucket, allowing the operator to use the bucket for scooping and loading operations.

LOADER SPEED CONTROL

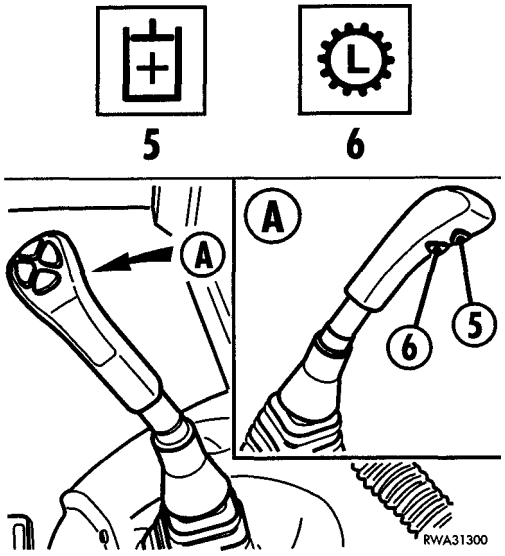
Pressing this button (5) maximizes oil delivery from the hydraulic pump and extra power to the loader system.

Remark

Do not press this button for more than 5 to 6 seconds during loader operation.

KICKDOWN

Pressing this button (6) causes the transmission to downshift from 2nd gear to 1st gear.



GEARSHIFT

WARNING

No mechanical connection exists between the gearshift and the transmission. Thus, a machine parked on a slope can move freely with the gears engaged. For this reason, always apply the parking brake.

Disconnect the gearshift electrical connector before arc welding on the machine. Failing to do so may damage the direction selector's microcircuits.

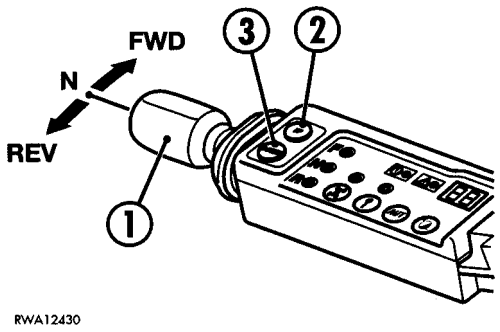
To start the engine requires the gearshift lever in the neutral (N) position.
Selecting reverse gear causes an alarm to sound. After starting the engine but before engaging the reverse gear:

- Apply the brake pedal.
- Shift the gearshift lever to reverse.
- If the alarm does not sound when in reverse, have a Komatsu dealer check the system.

The gearshift lever controls the direction of travel and gear shifting. Travel direction is selected with the fore and aft movement of the lever (1). To change gears, push the UP button (2) to upshift or the DOWN button (3) to downshift.

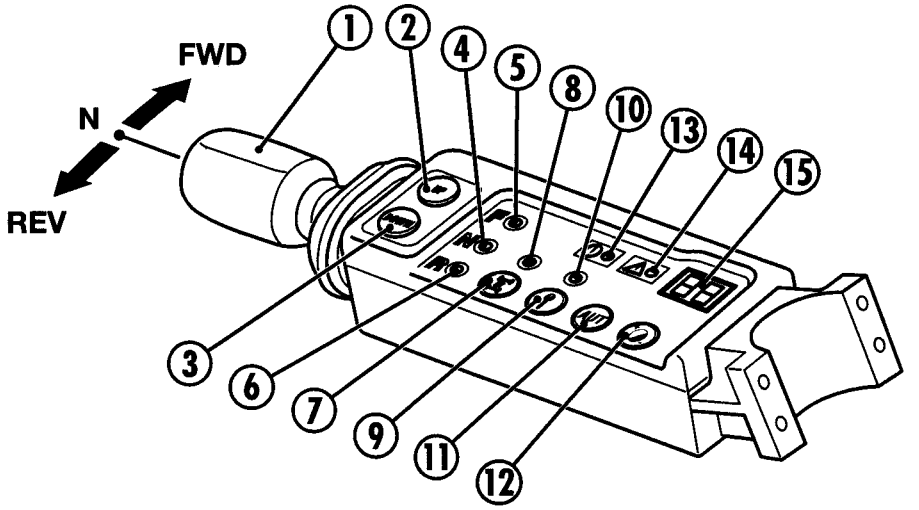
The semiautomatic system (SA) ensures the normal gearshift control, with the option of selecting the automatic system (AU).

A safety code prevents unauthorized machine movement.



RWA12430

CONTROLS

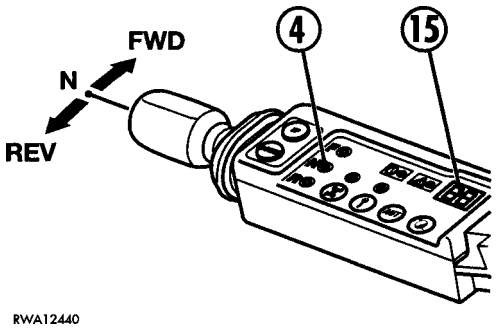


RWA12420

1. Gearshift lever: Forward (FWD), Reverse (REV) or Neutral (N) gear selection.
2. UP push button: Pressing this button upshift the transmission gears.
3. DOWN push button: Pressing this button downshifts the transmission gears.
4. “N” LED: Glows red to indicate that the neutral position is selected. If attempting to start the engine and the selector is not in neutral, the engine will not crank and this LED glows red.
5. “F” LED: Glows green to indicate that the forward direction of travel is selected.
6. “R” LED: Glows green to indicate the reverse direction of travel is selected.
7. FOUR-WHEEL-DRIVE push button: Pressing this button engages or disengages the four-wheel-drive system.
8. FOUR-WHEEL-DRIVE LED: Glows green when the four-wheel-drive system is engaged. When it is off, the four-wheel-drive system is not engaged. When it is flashing, the four-wheel-drive system has been temporarily disengaged because the transmission is in 3rd or 4th gear.
9. ANTITHEFT push button: After the engine is running, press this button for 3 seconds. Press the UP button (2) or DOWN button (3) to select each number of the four-digit antitheft code. Press the DIM button (12) after each number of the code is displayed (15). To temporarily disengage the antitheft system, press this button for 3 seconds after the engine is running.
10. ANTITHEFT LED: Glows green to indicate the antitheft operation is functioning and that the machine cannot move. The operator must enter the four digit antitheft code or the transmission will not engage.
11. AUT push button: Pressing this button while the engine is running engages or disengages the automatic logic function. Two red dots appear in the display (15) to indicate the automatic logic (AU) is functioning.
12. DIM push button: Press this button after each number of the four-digit antitheft code appears in the display (15). To adjust the intensity of the display lights: Press this button while the engine is running and then press the UP button (2) or DOWN button (3) until the desired illumination level is obtained.
13. CHANGE LED: Glows orange when the RPM is too high while attempting to change the direction of travel. Machine should be at idle to change the direction of travel.
14. WARNING LED: Glows red only when a problem is detected and a trouble code appears in the display (15). When certain fault codes are detected, the system automatically turns off the machine.
15. DISPLAY: Each digit of the antitheft code appears in this display. After entering the correct antitheft code, fault codes are displayed, if the system detects a problem with the transmission or the electronic control system.

STARTING THE ENGINE

Ensure that the gearshift lever is in the neutral (N) position. Turn the key to the “I” position. You will have 20 seconds to enter the four-digit antitheft code. If the engine is not started within 20 seconds after turning the key to the “I” position, the electronic system turns off and displays **dP** (15). Start over by turning the key to the “O” position and repeat the starting procedure.

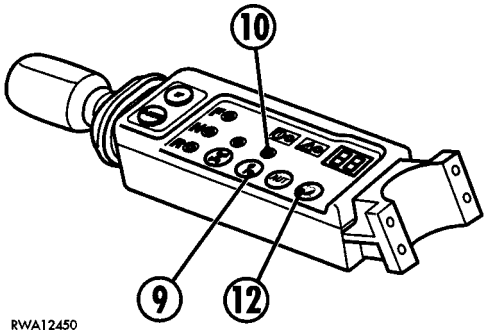


Remark

The gearshift lever remains locked in the neutral position until the parking brake is released.

ANTITHEFT

If the correct four-digit antitheft code is not entered, the transmission will not engage. To engage the transmission, enter the four-digit antitheft code after starting the engine. If the code is entered at the start of each shift and the machine is temporarily shut down — i.e. lunch — the code will not have to be re-entered after restarting the machine. If security is desired during the temporary shut down, press the antitheft button (9) for 3 seconds before turning the engine off. The code will have to be re-entered after starting the engine. To enter the code:



1. Start the engine.
2. If the antitheft LED (10) glows, perform the following:
   A. Press the UP (2) or DOWN (3) button to select the first digit of the four-digit code. The digit appears in the display (15).

   B. Press the DIM button (12) to enter the digit into the system.

   C. Repeat steps A and B for each of the three remaining digits of the antitheft code.

   D. Once the code is successfully entered, the green LED (10) will go out and three short beeps sound. And in the display (15), 2nd gear appears and then SA (semiautomatic logic).

If the incorrect code is entered, **88** appears in the display (15) and a beep (1 second) sounds. You will have four additional attempts to enter the correct code. If after the fifth attempt fails, the system turns off and the display is blank. Turn the ignition off for 30 seconds. And then restart the engine to obtain another five attempts at entering the correct antitheft code.

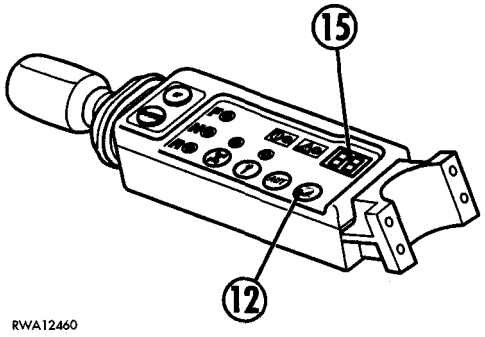
Remark

If the antitheft code is misplaced, contact your Komatsu distributor and provide the machine serial number and the controller serial number. The controller serial number is required to ensure that the controller has not been replaced because each controller has a different antitheft code.

DIM BUTTON

After each digit of the antitheft code is displayed (15), press the DIM button (12) so that each digit is entered into the system.

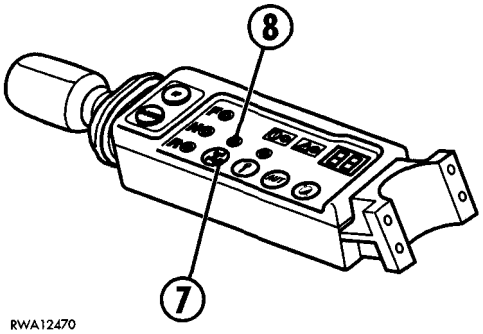
To adjust the intensity of the panel lights, wait until after starting the engine and 2nd gear has appeared in the display (15). Then press the DIM button (12). To obtain the desired illumination level, press the UP button (2) or DOWN button (3).



FOUR-WHEEL-DRIVE BUTTON

Four-wheel-drive provides traction when traveling on icy or wet roads, in mud or on gravel or slopes. Press this button (7) when the machine is at rest or low speed (1st and 2nd gear only) to engage the four-wheel drive. When the system is engaged, the green LED (8) glows. If the system is engaged and the transmission upshifts to 3rd or 4th gear, the green LED (8) flashes to indicate the four-wheel-drive system is temporarily disengaged.

Applying the service brakes while in 3rd or 4th gear, the four-wheel-drive system is automatically engaged. This action assists in braking, reducing the stopping distance. The green LED (8) glows steadily (not flashing) while braking in 3rd or 4th gear.



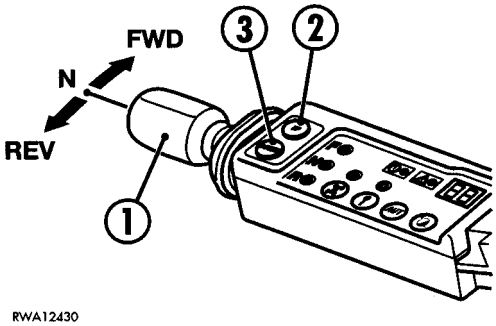
Remark

Do not engage the four-wheel drive when traveling at high speeds or on dry roads.

SHIFTING GEARS WITH SEMIAUTOMATIC LOGIC (SA)

After starting the engine, and entering the antitheft code, 2nd gear is always engaged with SA; semiautomatic logic is the default logic. When the gearshift lever is in neutral (N), pressing the UP button (2) upshifts to 3rd or 4th gear. Or, pressing the DOWN button (3) downshifts to 1st gear. You have 3 seconds after selecting the desired gear to engage the gearshift lever either FWD or REV.

Failing to select either FWD or REV within 3 seconds causes the system to interpret that an emergency exists. Thus, the red "N" LED (4) glows and the selected gear maintains. Press either the UP button (2) or DOWN button (3) again, and within 3 seconds engage the gearshift lever either FWD or REV.



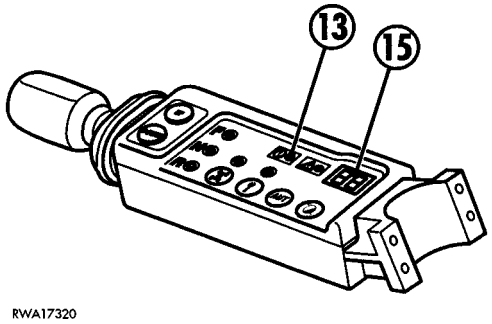
Remark

The gearshift lever remains locked in the neutral position until the parking brake is released.

Shifting the gears at an undesirable RPM causes the red LED (13) to flash and a beep (1 second) to sound. The system delays the shift until the optimal RPM is obtained. After the desired gear is engaged, the flashing red LED (13) turns off.

Press the UP button (2) or DOWN button (3) for 0.25 seconds. Pressing either of these buttons for 5 seconds and the system interprets it as a double selection; the system only stores one selection.

The engaged gear is shown on the display (15).



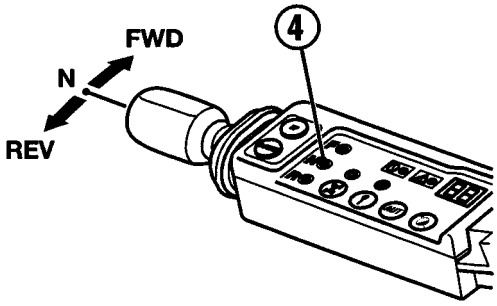
RWA17320

PREVENTING THE ACCIDENTAL SELECTION OF THE FWD/REV GEAR

If the machine is idle in neutral (N) for more than 3 seconds, the system interprets an emergency and the red "N" LED (4) glows. Press either the UP button (2) or DOWN button (3), and within 3 seconds engage the gearshift lever either FWD or REV.

Remark

The gearshift lever remains locked in the neutral position until the parking brake is released.

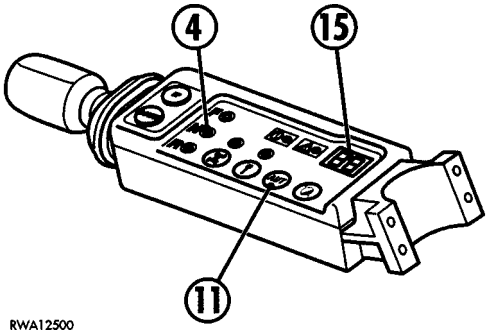


RWA12490

AUTOMATIC LOGIC

To engage the automatic logic, press the AUT button (11) once when the transmission in neutral. The transmission is in neutral when the red "N" LED (4) glows. Two red dots appear in the display (15) to confirm that the automatic logic is activated.

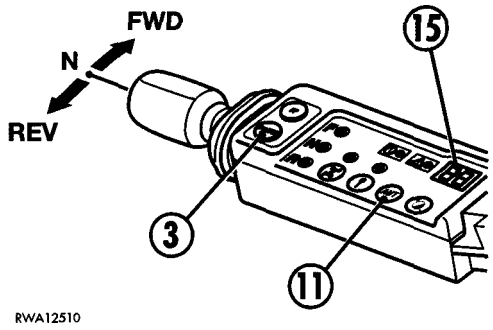
Pressing the AUT button (11) a second time deactivates the automatic logic function. The two red dots in the display (15) disappear, and the system returns to the default of semiautomatic logic.



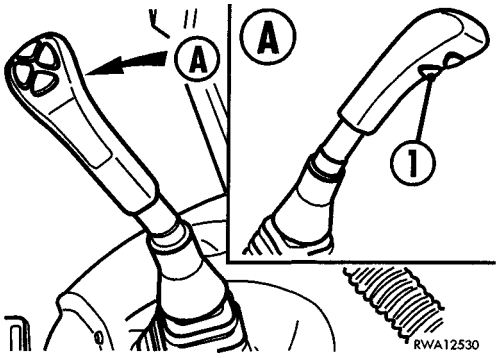
RWA12500

SHIFTING GEARS WITH AUTOMATIC LOGIC

Once the automatic function (11) is selected, the system automatically engages 2nd gear, which appears on the display (15). If a lower gear is needed, press the DOWN button (3) or.....



pressing the kickdown button (1).



After a forced downshift to 1st gear, the AU automatically upshifts from:

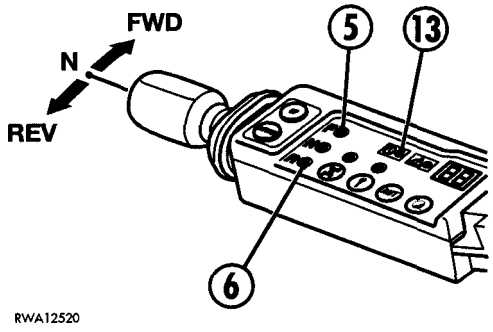
- 1st to 4th gear when in the FWD direction.
- 1st to 3rd gear while in the REV direction.

Automatic downshifting to 2nd gear occurs as needed in FWD or REV direction when in AU.

If the 2nd or 3rd gear solenoid become defective, three beeps (each 1 second long) are heard. Also an intermittent code appears on the display (15) and the system automatically shifts from AU to SA (semiautomatic logic).

SWITCHING DIRECTION OF TRAVEL

Regardless if the automatic or semiautomatic logic is engaged, switching the direction of travel is the same. To change the direction of travel, the transmission must be in 1st or 2nd gear. When requesting a change of direction in 3rd or 4th gear (no 4th gear in reverse, though) and the RPM is optimal, the system makes the change. However, if the RPM is not optimal, the red LED (13) flashes, a beep (1 second) sounds, and the change of direction is delayed until the RPM is optimal. Once the change of direction is complete, the “F” LED (5) or “R” LED (6) glows to confirm the change.

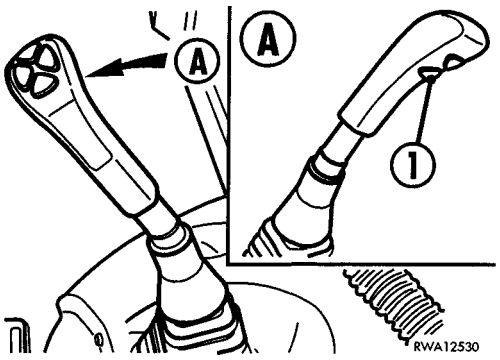


Remark

The gearshift lever remains locked in the neutral position until the parking brake is released.

KICKDOWN

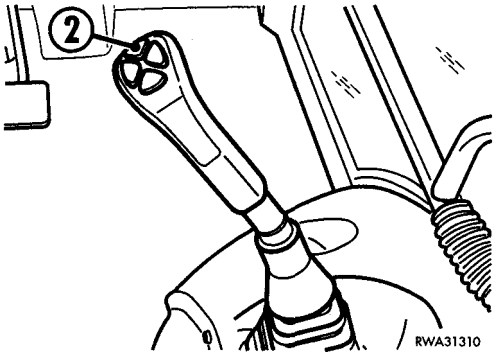
When using the loader, downshifting from 2nd gear to 1st gear is made easy with a press of a button (1) on the loader control lever. Regardless if the semiautomatic or automatic logic is in use, pressing this button (1) forces a 2-1 downshift. The exception to this rule is that when using semi-automatic logic, pressing this button (1) a second time forces a 1-2 upshift.



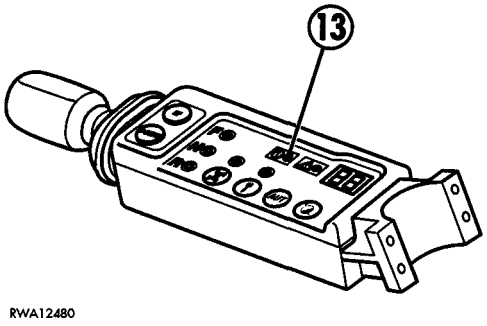
Upshifting or downshifting can determine the responsiveness of the shift. When downshifting from 2nd gear to 1st gear, the change is immediate. If upshifting from 1st gear to 2nd gear and the RPM is not optimal, the red LED (13) glows, a beep (1 second) sounds, and the upshift delayed until the RPM is optimal.

DECLUTCH

To raise and lower the loader fast, press and hold the declutch switch (2). The transmission disengages from the engine as long as the switch (2) is pressed while the transmission is in 1st or 2nd gear only.



If the RPM is too high after releasing the switch (2), the red LED (13) glows, a beep (1 second) is heard, and the system shifts the transmission into 3rd gear.



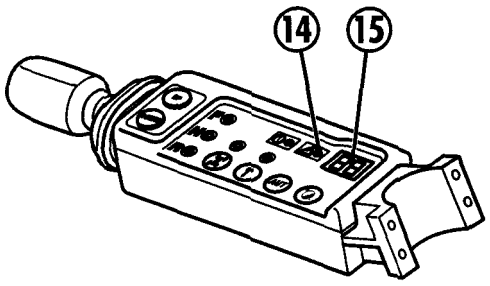
DIAGNOSTIC FUNCTION — MACHINE INOPERATIVE

The machine shuts down when the system detects any of the following problems:

- High oil temperature
- Transmission oil pressure low
- System voltage less than 7V
- Electronic card defect

During the self-test and when any of the above conditions are detected, the system: flashes the red warning LED (14), sounds 3 beeps (each beep 1 second), displays a message (15), turns off all solenoid valves.

Contact your local Komatsu distributor to diagnose the system and to make the needed repairs.



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DIAGNOSTIC FUNCTION — MACHINE OPERABLE

If a fault is detected and it is not serious, the machine continues to run, but the:

- red warning LED (14) flashes.
- system sounds three beeps, each beep 1 second.
- fault code flashes on the display (15) instead of the selected gear.

If a clutch-filling pressure sensor becomes defective, the system cannot engage the gear that corresponds to the defective sensor. If the 2nd and 3rd gear pressure sensors become defective, the system maintains the default semiautomatic logic; automatic logic cannot be selected.

If the 2nd gear solenoid becomes defective, the system automatically selects 1st gear instead.

If the RPM sensor becomes defective, automatic logic (AU) cannot be selected. Contact your local Komatsu distributor to diagnose the system and to make the needed repairs.

BRAKES AND ACCELERATOR

BRAKE PEDALS

The machine is equipped with a tandem brake pedal set-up. This set-up makes it possible to separate the right and left braking system while making sharp turns.

During normal operation or when traveling on roads, the brake pedals (2) should be locked to allow for equal braking at each wheel.

When operating at slow speeds in tight locations, the brake pedals (2) can be separated to allow independent braking of the right or left side.

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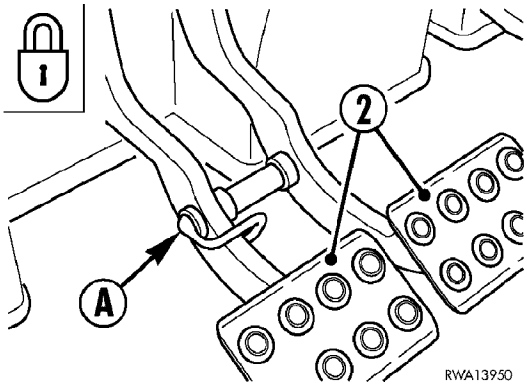
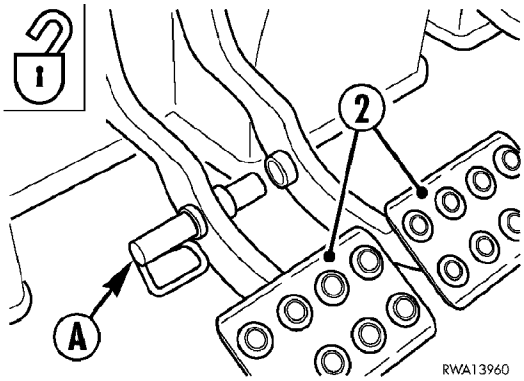


⚠ WARNING

When operating with the brakes pedals unlocked:

- **Always operate at a slow speed, no higher than 1st gear.**
- **Never operate the machine at high speeds with the pedals unlocked.**
- **Always lock the brake pedals immediately after completing the operation.**

Failure to comply with this warning may result in serious injury.

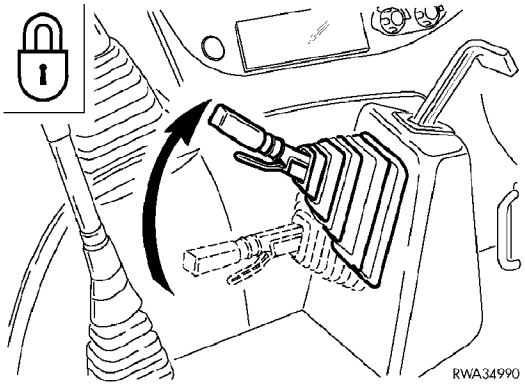


PARKING BRAKE

Before exiting the cab, apply the parking brake. To set the parking brake, bring the machine to a full stop. Grasp the brake handle firmly and squeeze the lock lever below the brake handle. Pull up on the handle until the brake handle locks in place. Release the lock lever. The brake light indicator will glow, indicating the emergency brake is applied.

Remark

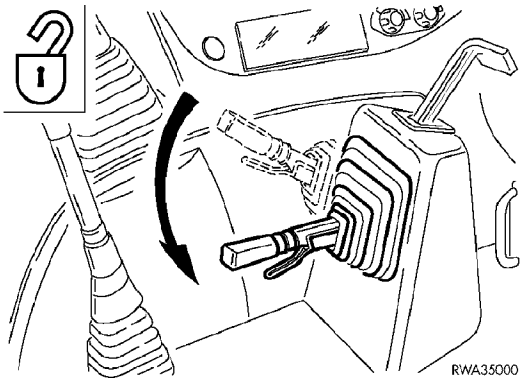
Leaving the machine in gear with the engine off and the directional control set in the forward or reverse position will not hold the machine in place. Use the parking brake. Always park the machine in neutral.



To release the parking brake, grasp the brake handle firmly. Pull the handle up slightly and squeeze the lock lever below the handle. Lower the handle down completely until it is fully released. The brake light indicator will go off, indicating the emergency brake is released.

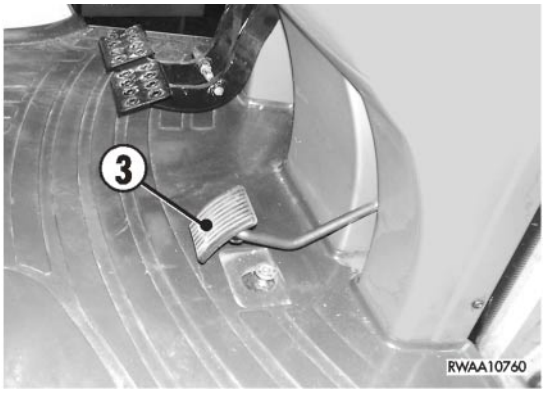
Remark

The rear wheel must be firmly on the ground in order for the parking brake to be effective. Always set the parking brake before exiting the cab.



ACCELERATOR PEDAL

Use the accelerator pedal (3) for road travel or when using the loader. When using the loader and the accelerator pedal, be careful not to strain the machine. Always accelerate smoothly when using the loader.

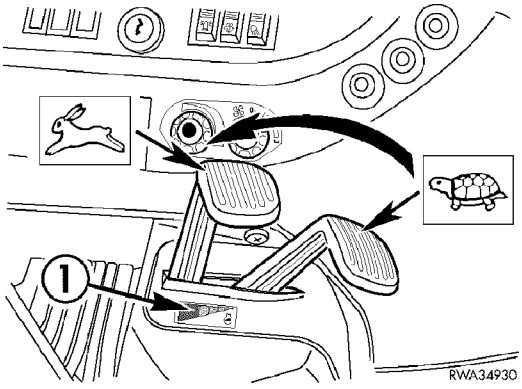


HAND THROTTLE

Use the hand throttle when operating the backhoe or loader. The throttle can also be used during engine warm up or during maintenance. The positions for the hand throttle are:

Idle Position (turtle): Throttle handle pulled forward.

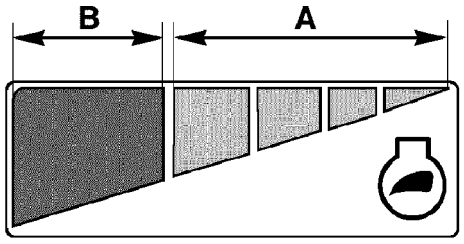
Maximum RPM Position (rabbit): Throttle handled pulled back.



THROTTLE OPERATING TIPS

Avoid using the machine with the throttle lever completely in the maximum RPM position. Doing so increases fuel consumption and engine wear. For proper throttle use, refer to the indications listed on the decal near the throttle handle.

- **Green area "A"**: This area indicates the engine speed is approximately 1,700 RPM, the recommended RPM for normal operation.
- **Red area "B"**: This area indicates the engine speed is about 1,900 RPM, the maximum RPM allowed for using the backhoe.



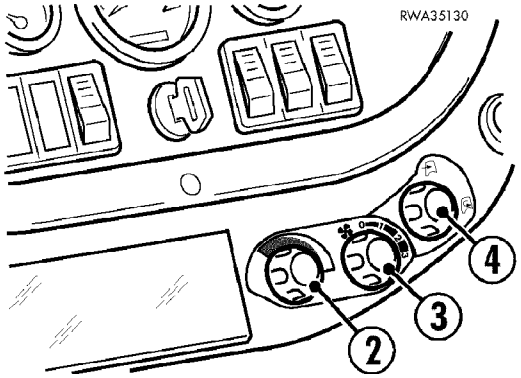
Remark

Monitor throttle speed using the tachometer.

CAB ENVIRONMENT AND SAFETY EQUIPMENT

Ventilating, cooling, and heating the cab reduce operator discomfort and fatigue in cold or hot environments. This system also dehumidifies the air once inside the cab, reduces condensation on the cab windows and reduces the pollen from circulating inside the cab.

HEATING AND AIR CONDITIONING



AIR CONDITIONING

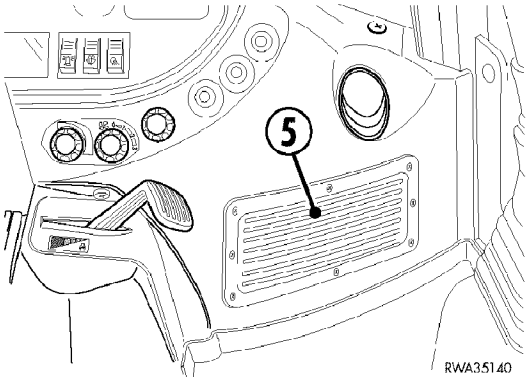
Besides the air conditioning switch and blower control switch (3) two other controls exist: Temperature (2) and recirculation (4). To control the cab temperature, turn the knob (2) clockwise to increase the temperature and counterclockwise to decrease the temperature. To regulate the outside air supply entering the cab, turn the knob (4) clockwise to prevent outside air from entering the cab, recirculating air already inside the cab. And turning the knob (4) counterclockwise allows outside air in the cab. Recirculation (4) causes the cab to warm up or cool down rapidly, and prevent dust and pollen from entering the cab. Any pollen that enters the cab collects on the wet coils and fins of the evaporator. Because the evaporator temperature is below the dew point, the moisture in the air condenses on the evaporator. Thus, the air inside the cab is also dehumidified.

Remark

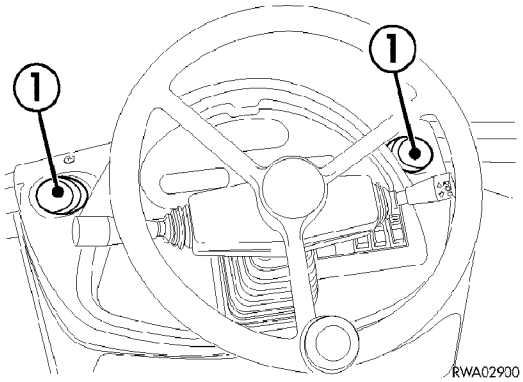
Do not use the recirculation mode for long periods of time or the cab windows will fog up.

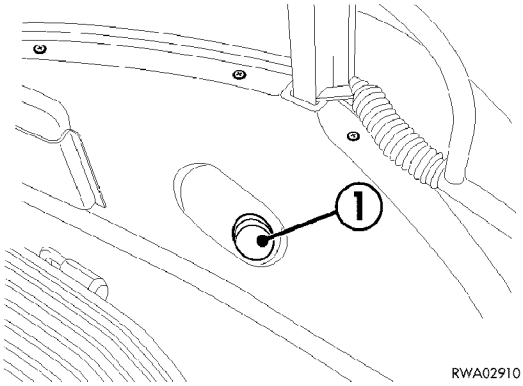
HEATING SYSTEM

A heater is standard equipment, and so is the temperature control switch (2) and the blower control switch (3). To control the temperature, turn the knob (2) clockwise to increase the temperature and counterclockwise to decrease the temperature.



Increasing or decreasing the fan speed also affects the temperature inside the cab. If the temperature is set to maximum heat and the fan speed is low, very little heat flows out the vents (1, 5). However, if the temperature is set to maximum heat and the fan speed selected is high, large volumes of hot air flow out the vents (1, 5). This situation warms the inside of the cab fast.



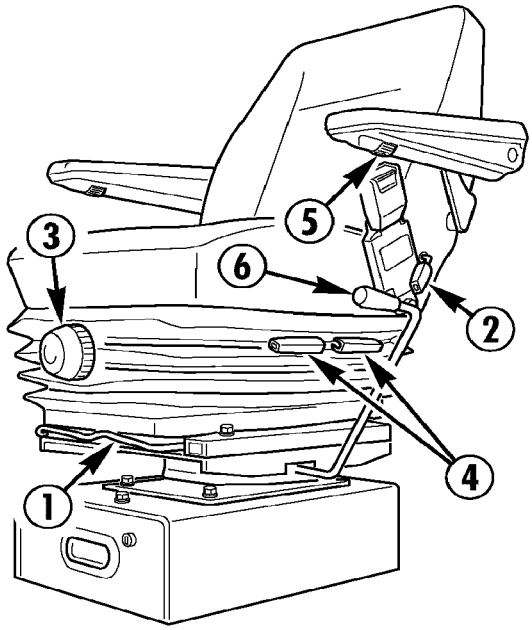


SEAT AND SEAT BELT

SEAT

The seat is designed for maximum operator comfort which helps reduce operator fatigue. There are six seat adjustments:

- Longitudinal adjustment
- Back inclination adjustment
- Adjustment of seat suspension
- Seat cushion height
- Armrest adjustment
- Rotation for backhoe operation



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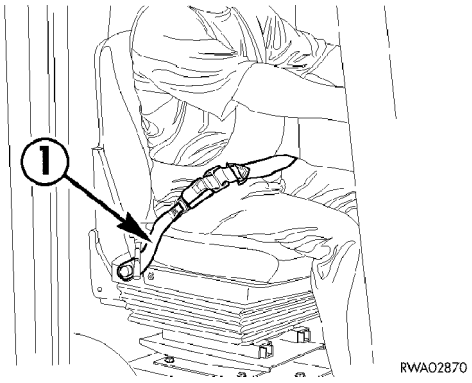
The operator can choose the most comfortable operating position simply by using the listed features. For longitudinal adjustment, lever (1) can be used to position the seat in a forward to backwards positions. The back adjustment (2) is for positioning the upright inclination for the operator's back angle. The softness or dampening of the ride and vibrations can be controlled by adjusting knob (3) to the desired setting. To increase firmness, turn the knob clockwise, to decrease firmness turn the knob counterclockwise. The height of the seat can be adjusted with lever (4) either up or down. To adjust the armrest angle, use the roll knobs (5) to change the inclination of the arm rest angle. When operating the backhoe, use lever (6) to rotate the seat from a loader position to the backhoe position.

SEAT BELT

The seat belt (1) is provided for your safety during operation of the machine. OSHA (occupational safety and health administration) requires the operator to use this seat belt during operation.



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The seat belt keeps the operator securely fastened to the seat should machine rollover. Before starting the engine or doing anything in the cab, fasten the seat belt snugly around your waist.

Always use the seat belt when operating the machine, even for a moment. If the seat belt is damaged or worn replace it immediately. Never rely on a damaged or worn seat belt to hold you in place if a rollover occurs. Using the seat belt could save your life.

Remark

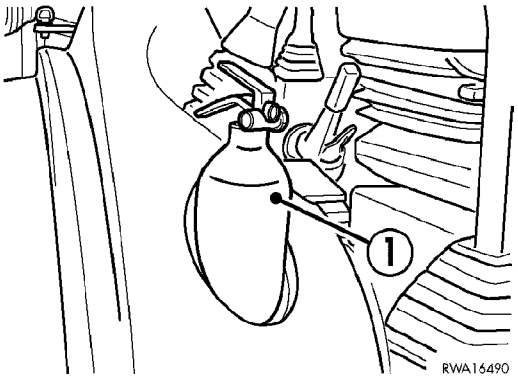
Replace the seat belt every 4 years as routine maintenance. That's because the belt weakens after a length of time, reducing the belt's effectiveness.

SAFETY EQUIPMENT AND STORAGE AREAS

FIRE EXTINGUISHER

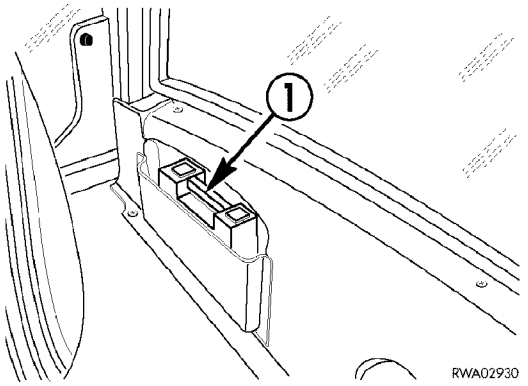
The machine owner must provide a fire extinguisher for the machine. Storage area (1) is provided in the cab to hold the fire extinguisher.

If you equip your machine with a fire extinguisher, learn how to use it. Before starting any work operations always check the fire extinguisher to be sure it is fully charged and in working condition.



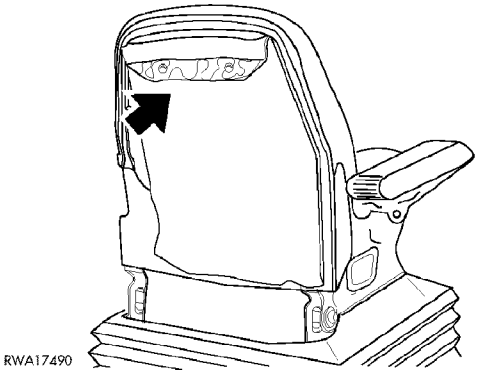
FIRST AID KIT

The machine owner must provide a first aid kit for the machine. A storage area (1) is provided in the cab to hold the first aid kit. Check the first aid kit frequently to be sure it is in good condition and the medical supplies are not damaged or missing.



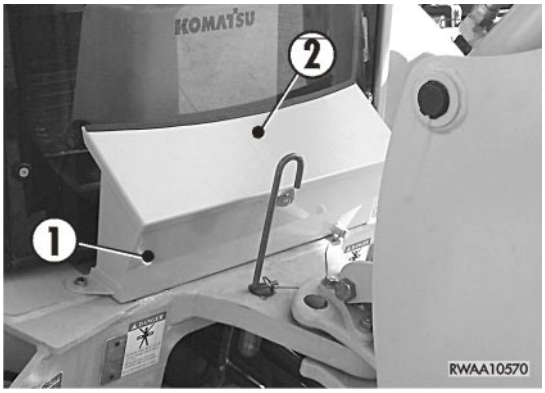
DOCUMENT STORAGE

This area is provided for the storage of any service documents.



TOOL CASE

This location is for storing extra tools, if needed. When using the tool case (1), firmly close the cover (2) to prevent tools from falling out.



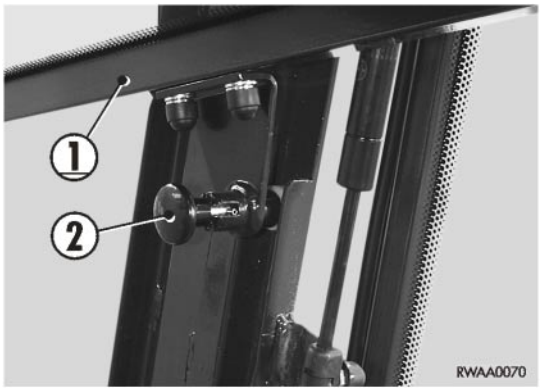
CAB AND GUARDS

The cab offers the operator the option of a controlled environment as well as the safety of the ROPS (rollover protective structure). The guards equipped with the machine are there to protect all personnel from injury due to contact with moving or hot parts. It is important that all these structures be kept in good condition and replaced if damaged.

CAB

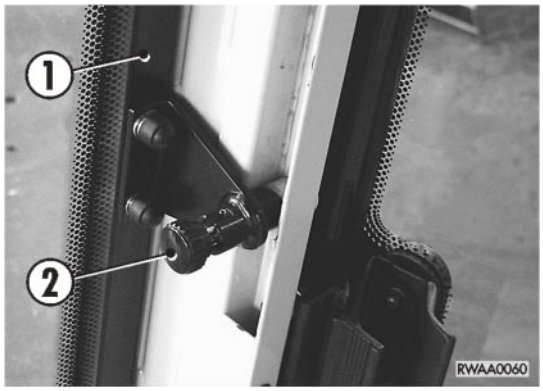
DOORS AND WINDOWS

On the cab, the rear upper window (1) of the cab can be opened completely. When open, the window is positioned and secured under the roof. The lower window is fixed in place. When raising the upper window, be sure it is securely latched in place. Doing so will prevent the window from suddenly falling out during operation.

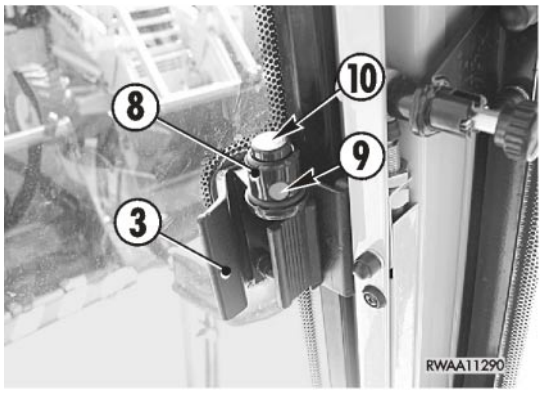


Operate the rear cab doors (1) only after releasing the window latches (2) by pulling and lifting the window itself.

After positioning the window, fit the window latches (2) into the holes in the track.



Open the side windows after releasing the safety lock (8). Therefore, proceed in the following sequence:
Press button (9) to release safety lock (8), then press lock lever (3).



To open the side windows completely:
Rotate the window completely and engage latches (4) in the locks (5) provided on the door.

When closing the side window, always engage safety lock (8) by pressing button (10)

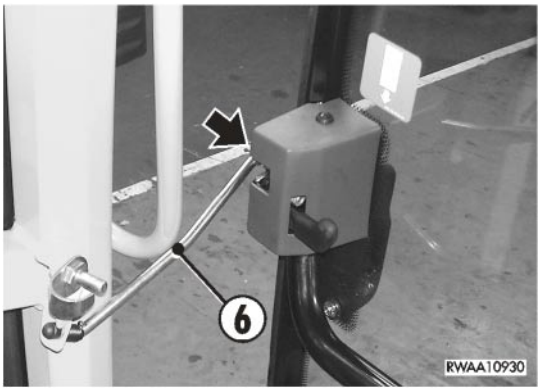
Remark

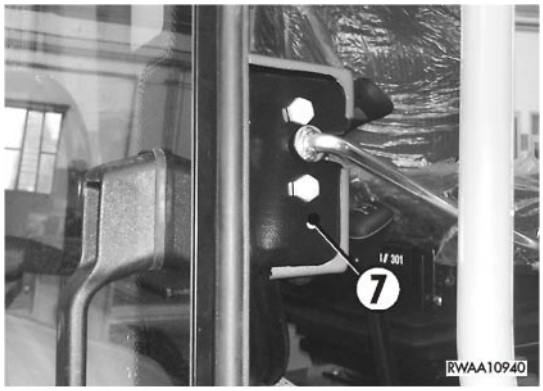
Always secure the side windows in the open position with the locks (5) or the side windows must remain closed. Periodically lubricate the locks (5) with the specified grease.

The cab doors can be partially opened by securing the locking device (6) in the handle support recesses (7).

Remark

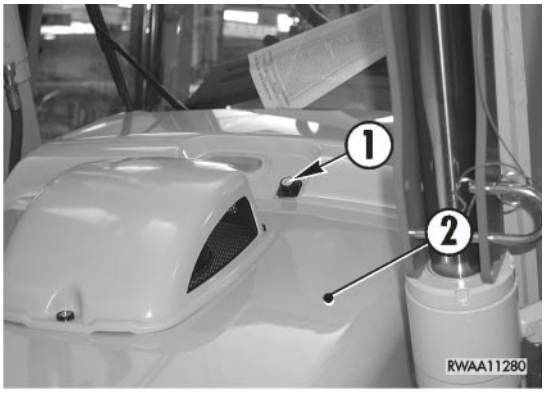
Always secure the doors with the locking device (6) or keep the doors closed.





ENGINE HOOD

After releasing the lock (1), open the hood (2). To close the hood, lower it slowly into the lock position.



WARNING

When working on the engine with the hood raised:

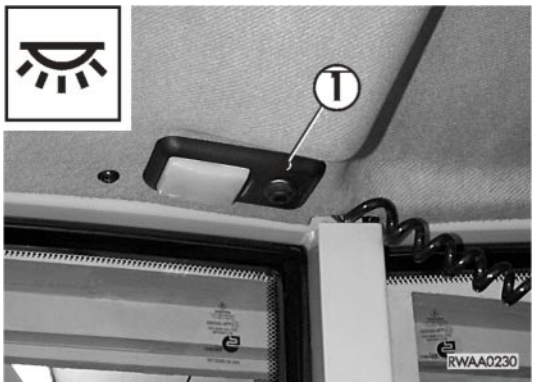
- **Do not open the hood with the engine running.**
- **Do not operate the machine without a hood.**
- **Lower the loader completely to the ground before opening the hood. However, when circumstances dictate that the loader must be raised to perform maintenance or repairs, engage the safety lock in the loader arm.**

ELECTRICAL

SWITCHES AND EXTRA ACCESSORIES

OVERHEAD LAMP

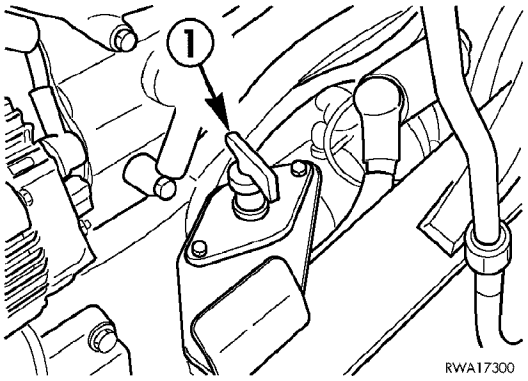
The overhead lamp is for view items inside the cab when operating the machine at night.



BATTERY DISCONNECT

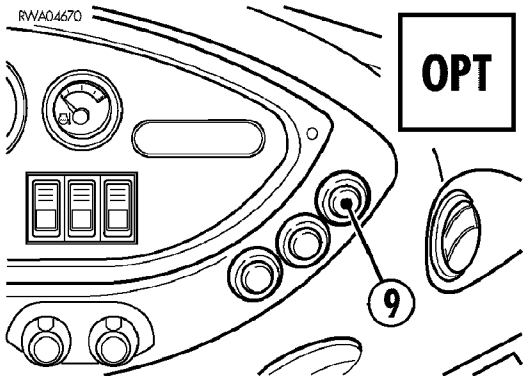
The battery disconnect switch (1) is used to disconnect the battery from the machines electrical system . This feature offers extra security on the job site when the machine will be unattended for long periods of time.

Open the engine hood. The switch is on the left side of the frame near the starter motor. Rotate the switch counterclockwise and then pull it up and remove it to disconnect the electrical system. To reconnect the electrical system, reinsert the switch and rotate it clockwise.

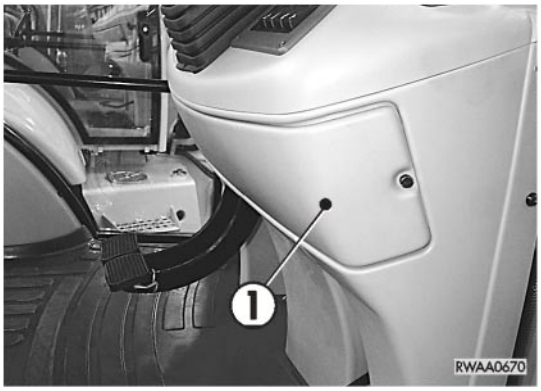


OPTIONAL ELECTRICAL SWITCH LOCATION

This location would be reserved for any electrical or electrically operated accessories.



FUSES AND RELAYS — ACCESSORIES



The fuses and relays are below the steering wheel inside the front dashboard. Removing the cover (1) exposes the fuses and relays, if service is required.

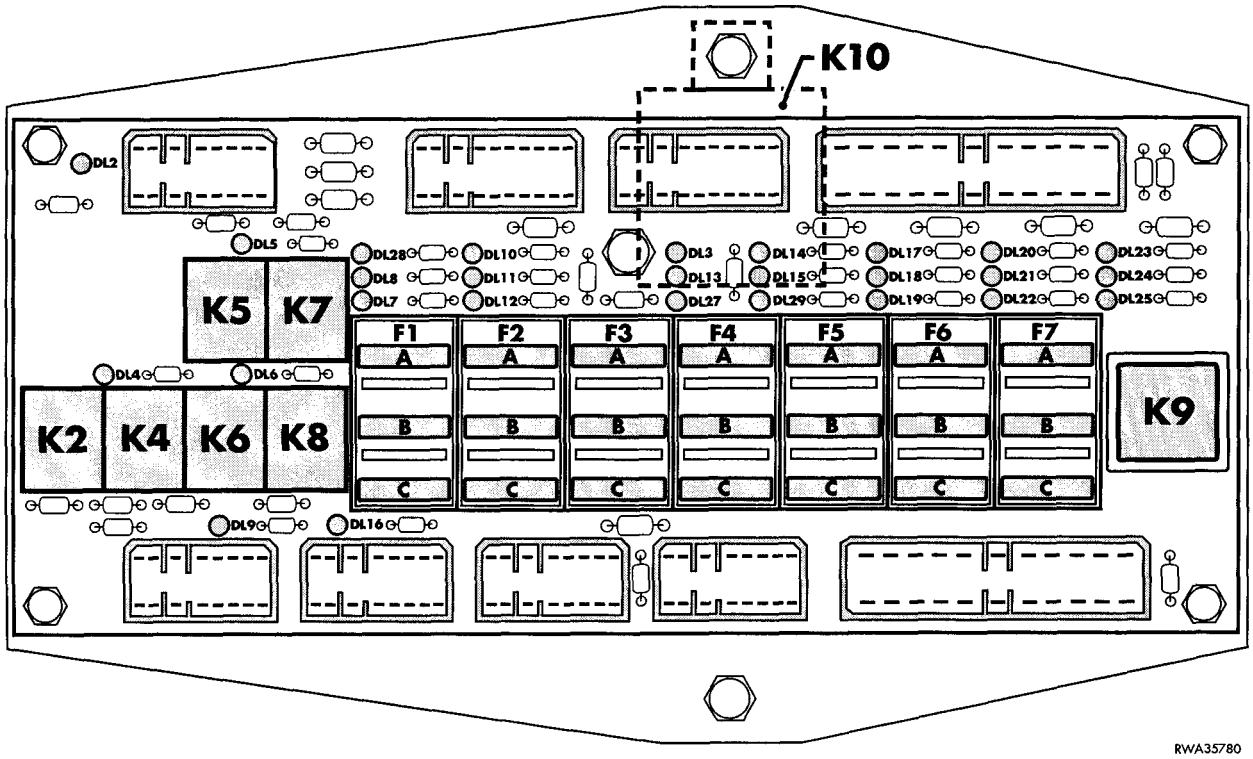
If an electrical system fails, check the fuses and relays first. Each fuse bank is set-up with a red LED indicator to alert the operator or technician of a blown fuse in a that bank. The relay bank has a yellow LED to indicate a defective relay.

After removing the cover (1), the fuses and relays are easily accessible. With the ignition key to the “ON” position, look and see if any LED is on. Before replacing a fuse or relay, turn the ignition switch to the “OFF” position.

Remark

When replacing fuses or relays always check the contacts for corrosion. If the panel is badly corroded, contact your Komatsu Dealer for repair. Never replace a fuse with a fuse of higher or lower amp rating. Damage to the electrical system may result.

FUSE AND RELAY GRID



FUSES IDENTIFIED

Fuse Position		Color	Capacity (Amps)	(Red) LED	Circuit Involved With Blown Fuse
F1	A	Light blue	15	DL25	Low beam
	B	Violet	3	DL8	Right rear and left front parking light
	C	Violet	3	DL7	Left rear and right front parking light
F2	A	Red	10	DL10	Cigarette lighter
	B	Brown	7.5	DL11	Cab overhead lamp and radio
	C	Red	10	DL12	Emergency power switch
F3	A	Brown	7.5	DL3	Start enable
	B	Brown	7.5	DL13	Interments - Switch lights
	C	Brown	7.5	DL27	Optional equipment solenoid
F4	A	Brown	7.5	DL14	Differential lock solenoid
	B	Red	10	DL15	Direction selector
	C	Light blue	15	DL29	High beam
F5	A	Light blue	15	DL17	Heating
	B	Light blue	15	DL18	Rear work lamps
	C	Light blue	15	DL19	Front work lamps
F6	A	Light blue	15	DL20	Windshield wiper - Flashing light
	B	Brown	7.5	DL21	Dimmer switch - Horn relay
	C	Red	10	DL22	Direction indicators
F7	A	Brown	7.5	DL23	Monitor (if provided)
	B	Red	10	DL24	Horn
	C	Brown	7.5	DL25	Alternator - Engine stop solenoid

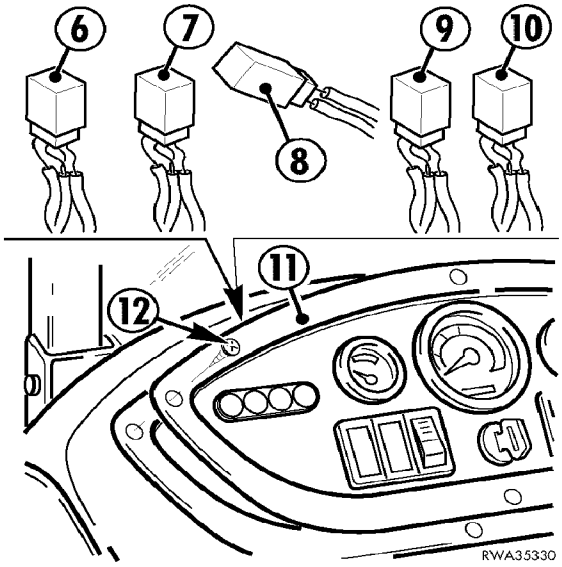
RELAYS IDENTIFIED

Relay Position	(Yellow) LED	Circuit Involved With Inoperable Relay
K2	DL2	Reverse gear relay
K4	DL4	Start enable relay
K5	DL9	Low beam relay
K6	DL16	High beam relay
K7	DL5	EGM power supply relay
K8	DL6	Horn relay
K9	—	Blink relay
K10	—	Flasher

DASHBOARD RELAYS

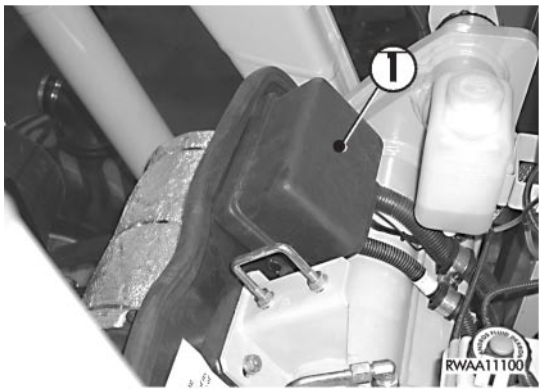
The relays (6, 7, 8, 9, 10) are located behind the instrument bezel in the dashboard above the fuse panel. To access these relays, remove the screws (12) and then the instrument bezel (11).

Position	Description
6	Blower 3rd speed relay (if equipped)
7	Air conditioning relay (if equipped)
8	Return-to-dig relay (for loader)
9	Automatic power relay
10	Fan load relay (if equipped)



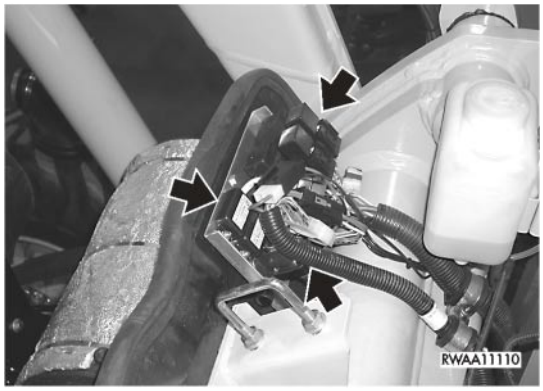
FUSES AND RELAYS — ENGINE

The fuses and relays for the engine electrical system are grouped in one fuse panel located inside the engine compartment. They are protected with a plastic cover. Removing the cover (1) exposes the fuses and relays, if service is required.

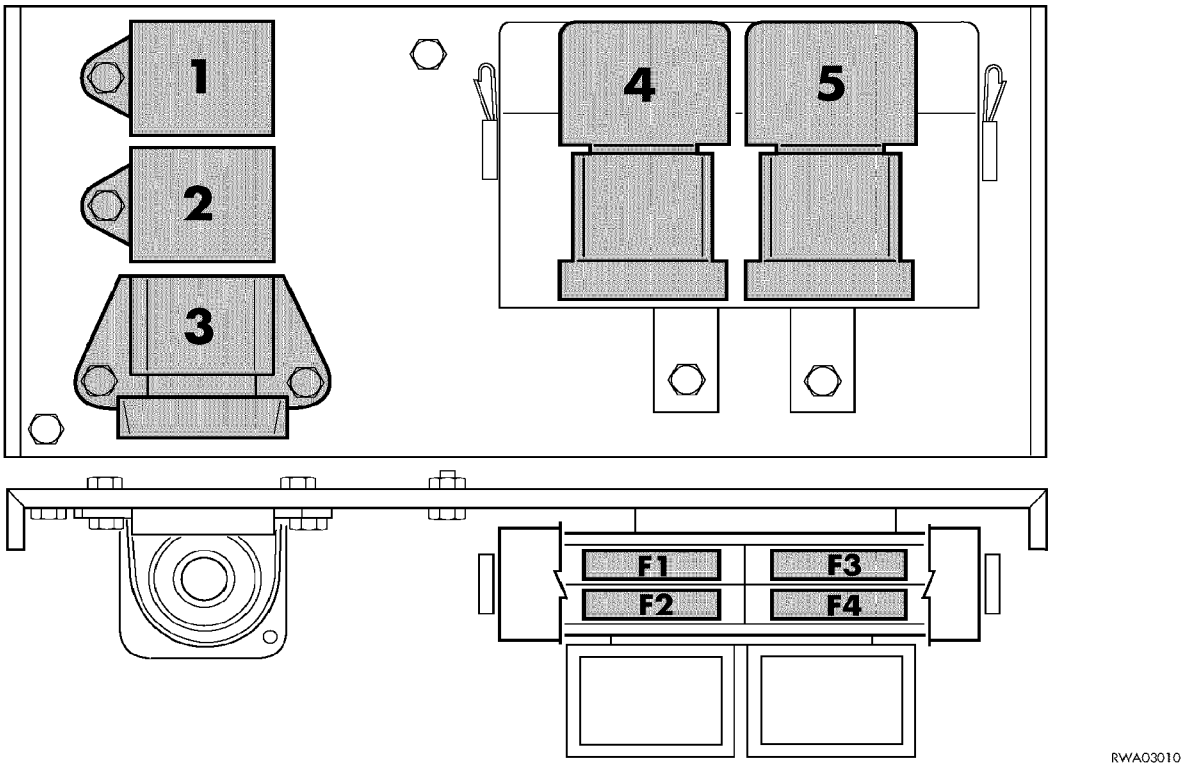


Remark

When replacing fuses or relays always check the condition of the contacts for corrosion. If the panel is badly corroded, contact your Komatsu Dealer for repair. Never replace a fuse with a fuse of higher or lower amp rating. Damage to the electrical system may result.



FUSE GRID



FUSES IDENTIFIED

Fuse Position	Color	Capacity (Amps)	Circuit Involved With Blown Fuse
F1	White	80	Glow plug preheat
F2	Green	30	Engine stop
F3	Blue	60	Engine start
F4	White	80	Alternator

RELAYS IDENTIFIED

Relay Position	Circuit Involved With Inoperable Relay
1	Engine stop enable timer
2	Preheat timer
3	Glow plug preheat relay
4	Engine stop solenoid relay
5	Engine start enable relay

OPERATING THE MACHINE

Before starting work operations, it is important to perform several procedures to be sure your equipment is safe to operate. It is also important to be aware of the hazards involved when operating your machine. Study the section in safety before proceeding with any work operations.

DAILY CHECKS BEFORE STARTING

⚠ WARNING

If engine oil gets on the hot engine parts, a fire may result. Clean up any oil on engine parts before starting the engine when it is cold.

Before starting the engine, walk around the machine and look under the machine for:

- Screws or nuts from the machine on the ground.
- Oil, fuel, coolant, or fluid leaks.
- Condition of the work equipment.
- Condition of the tires and wheels.

If any problems are detected, have the problems repaired before starting work. Also, ensure that the cab windows are clean before starting work. If not, clean them.

OPERATIONAL CHECKS

⚠ WARNING

Before starting the machine, the operator must ensure that all mechanical safety locks of the equipment controls are in the correct position. Thus, the equipment cannot move unexpectedly, which could cause an accident and injuries.

From the driver's seat, check the following:

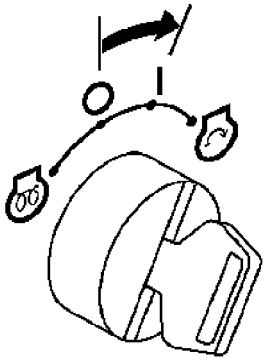
- Couplings of the safety locks for the front bucket and the backhoe control levers.
- Hand throttle position.
- Turn signal lever in the neutral position.
- Gearshift lever in the neutral position.
- Parking brake operation.

Turning the ignition key to the "**I**" position performs a light bulb check of the warning lights. Check that the following warning lights glow:

- Oil pressure.
- Generator.
- Preheating.
- Brake.

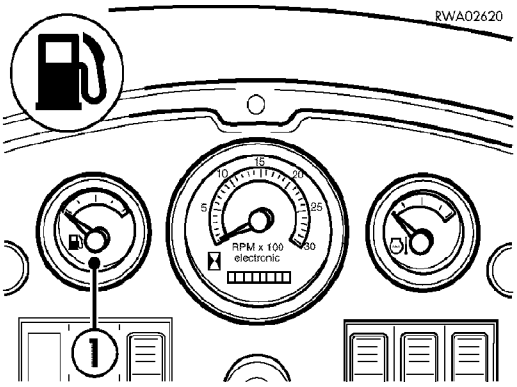
If any of the above lights fail to glow when the key is at the "**I**" position, replace the bulb(s) before starting work.

Check that the warning alarm also sounds when the key is at the "**I**" position. If the alarm fails to sound, repair it before starting work.



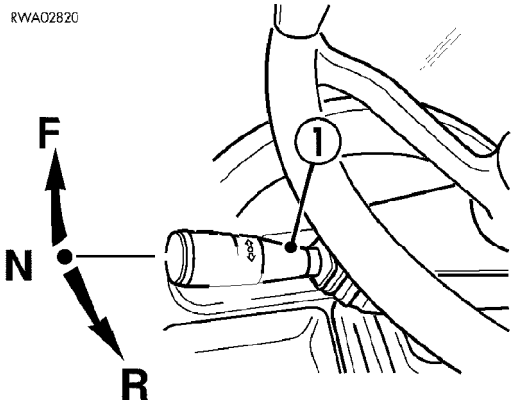
RWA01960

CHECKING THE FUEL SUPPLY



Before starting the machine it is important to be sure there is enough fuel in the fuel tank. To check, turn the ignition key to the "ON" position and read the fuel gauge (1). If fuel is low, add fuel. Be sure when filling the fuel tank you leave enough space in the tank for the fuel to expand. Never overfill the fuel tank. Do not smoke when refueling. And do not use fuel additives or mix gasoline with diesel fuel. Additives may damage the fuel pump and injector parts.

STARTING THE ENGINE



Before starting the engine be sure all personnel are clear of the work area or travel path. To start the engine:

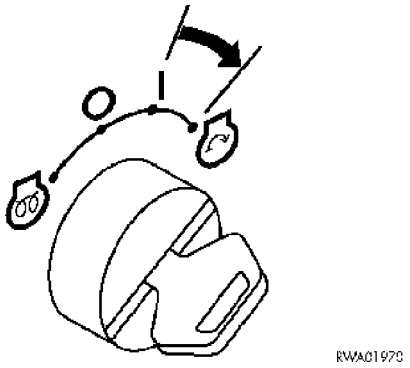
Be sure the gearshift lever (1) is in neutral (N). The engine will not start with the gearshift lever in forward or reverse.

Remark

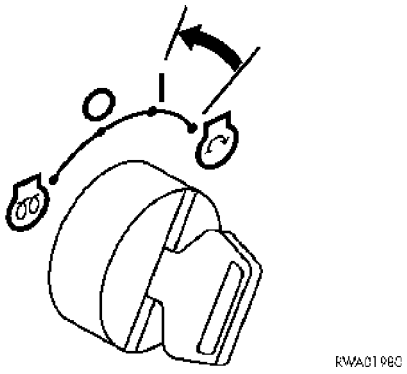
The gearshift lever remains locked in the neutral position until the parking brake is released.

Be sure the throttle control lever is set to low idle.

With your foot off the accelerator pedal, turn the ignition key to the start position.



When the engine starts, release the key, the ignition switch automatically returns to the "**I**" position. With the engine running, check all the gauges and warning lights. None of the warning lights should glow while the engine is running. Take any corrective actions before starting the work. Allow the engine and hydraulic system time to warm up before starting work.



Remark

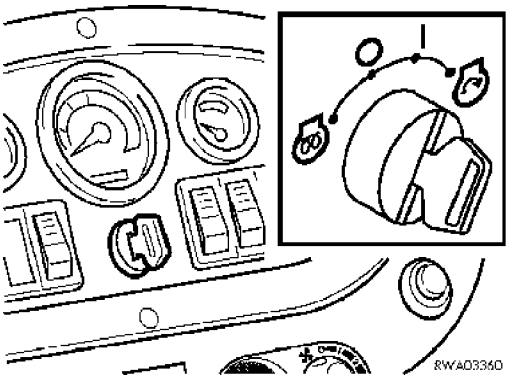
If the engine does not start within 15 seconds, release the ignition switch and wait 30 seconds before trying again. If it will not start, do not continue to crank the engine, or damage to the starter may result. Contact your Komatsu Dealer for repairs.

STARTING THE ENGINE IN COLD WEATHER

⚠ WARNING

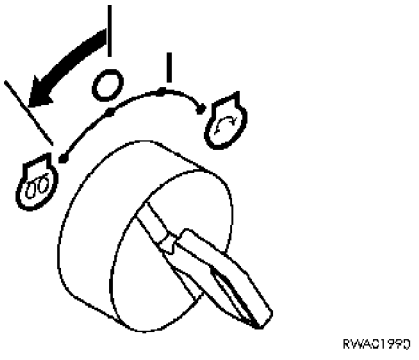
Do not use any starting fluids or ether to assist in starting an an engine in cold weather. These products may cause an explosion, damaging the engine or causing injury.

To start the engine in cold weather, use the following procedures:

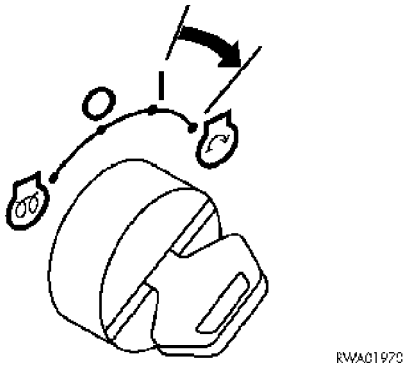


Be sure the gearshift lever is in a neutral position. The engine will not start with the gearshift lever is in forward or reverse.

Be sure the throttle control is set at low idle. Turn the key to the preheat position. The outside temperature determines the preheat time. For every 1° F below 32° F, the glow plug must be on the same number of seconds. For example, if the temperature is 10° F, the glow plug must be on for 22 seconds, the difference from 32.



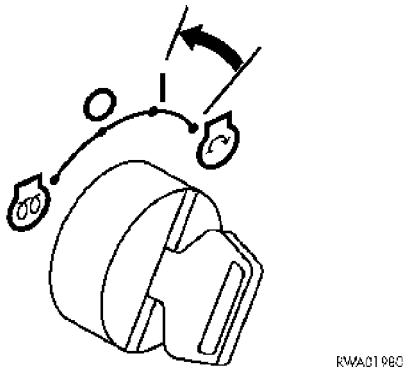
After the preheat is complete, depress the accelerator half way, or fully depressed in extremely cold weather; do not pump the accelerator pedal. Crank the engine until it starts.



When the engine starts, release the key and accelerator pedal. The switch automatically returns to the "**I**" position. With the engine now running, check all the gauges. None of the warning lights should glow while the engine is running. If any warning lights glow, make the needed repairs before starting work. Allow the engine and hydraulic system to warm up before starting work.

Remark

If the engine fails to start within 15 seconds, release the ignition switch. Wait 30 seconds before trying again. If the engine will not start, do not continue to crank the engine or starter damage may result. Contact your Komatsu Dealer for repairs.



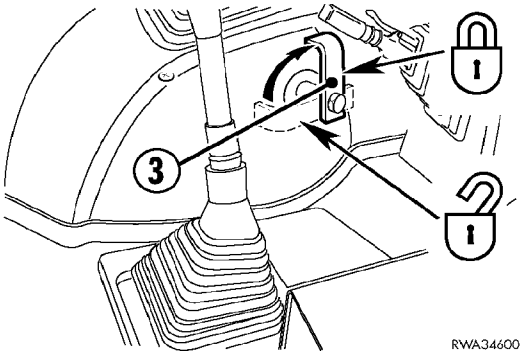
WARMING UP THE MACHINE

In cold weather, warm up the engine and the hydraulic oil before moving the machine. Starting work operations with a cold machine causes unnecessary parts wear. To warm up the engine and hydraulic oil:

1. Unlock the loader control lever (3).
2. Set the throttle at a 1/4 above low idle.
3. Raise and lower the loader boom while operating the bucket. Do this step several times to warm up the engine oil and hydraulic oil.

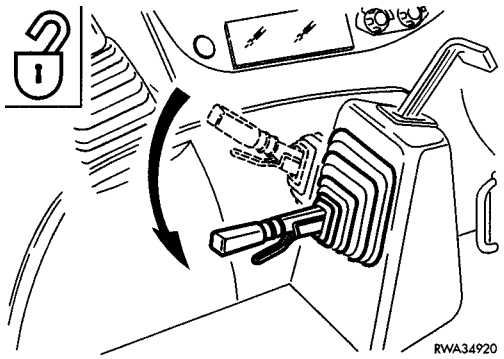
Remark

Do not accelerate or rev the engine at high speeds when cold, or damage to internal engine parts may result.



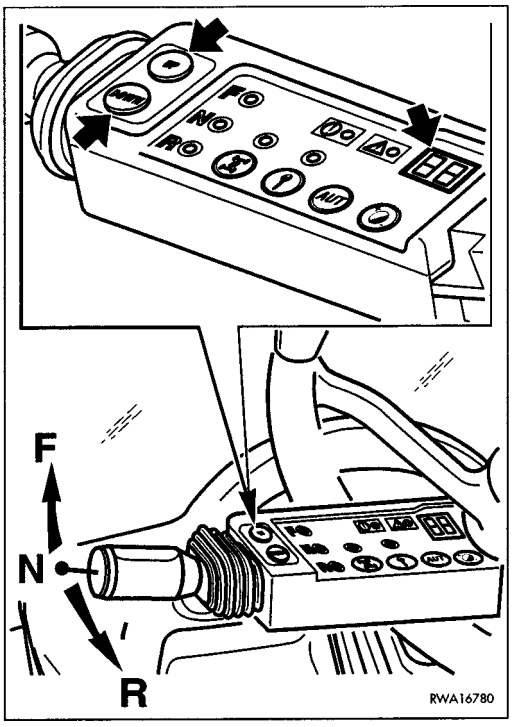
MOVING THE MACHINE

After warming up the machine, apply the service brake and then release the parking brake. To release the parking brake, squeeze the safety lever until the parking brake lever can be forced downward. The gearshift lever remains locked in the neutral position until the parking brake is released.



Entering the antitheft code correctly allows the transmission to operate. After entering the correct code, press the UP or DOWN button to select the desired gear. Within 3 seconds after selecting the gear, move the gearshift lever to move the machine forward (F) or reverse (R).

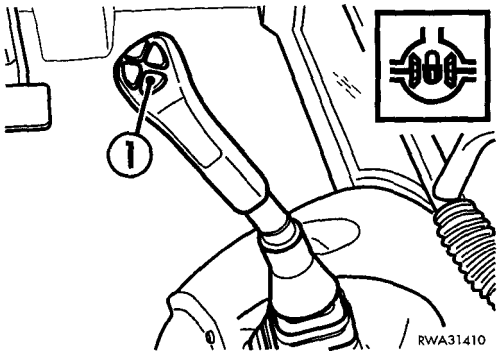
Sound the horn and proceed in the desired travel direction.



To provide additional traction to push larger loads, two different methods exist: differential lock and four-wheel drive. A side benefit of these feature is that traction also increases when traveling on icy or wet surfaces or in mud.

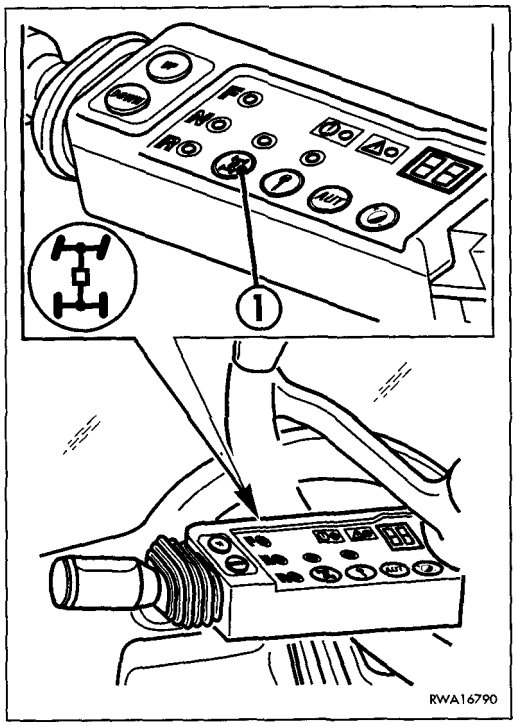
DIFFERENTIAL LOCK

Locking the differential gears offers traction to both drive wheels. Press the button (1), which is located on the loader control lever, only when the machine is at rest (wheels not spinning) and the differential locks. The differential automatically unlocks when it is not needed.



FOUR-WHEEL DRIVE

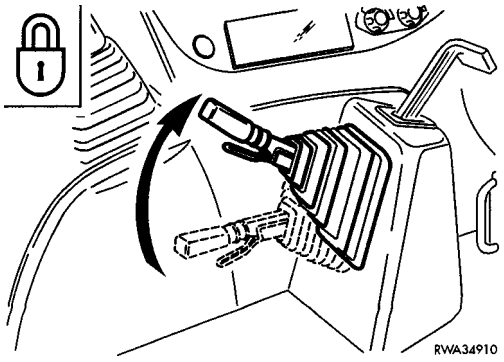
Pressing the four-wheel-drive button (1) causes all four wheels to drive the machine, not just two wheels. When the four-wheel drive is engaged, the LED above the push button (1) glows.



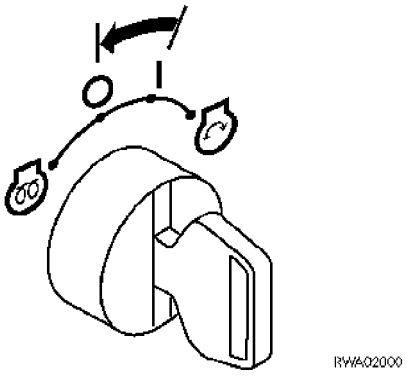
BEFORE TURNING THE ENGINE OFF

Before turning the engine off, allow the engine to idle at 1,200 RPM for about 5 minutes to cool the system down. While the engine is idling during the cool down period:

1. Lower all work equipment to the ground.
2. Shift the gearshift lever into the neutral position.
3. Set the throttle at a low idle position.
4. Squeeze the safety lever until the parking brake lever can be pulled upward to apply the parking brake.



5. After 5 minutes, turn the ignition switch to the OFF position and remove the key.



Remark

Never turn the engine off when at a high RPM. Always allow the engine time to idle and cool down before turning the engine off.

OPERATING THE LOADER

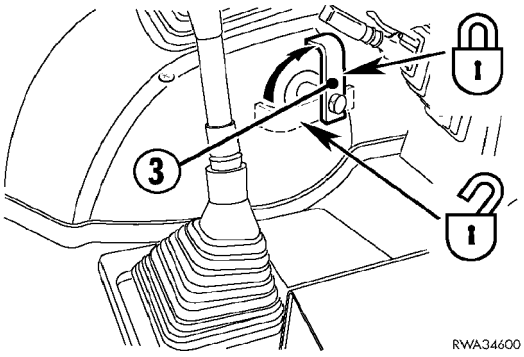
⚠ WARNING

When operating the loader:

- **Always keep the bucket as close to the ground as possible.**
- **Never raise or lower the bucket while traveling. Always come to a complete stop when raising or lowering the loader bucket.**
- **Avoid lowering the bucket too quickly, or damage to the lift arm cylinders may result.**
- **When traveling with a loaded bucket, maintain a height of 50 cm (20 in.) above the ground.**
- **When loader operations are completed, lower the loader bucket to the ground and set the loader lock.**
- **Avoid sharp turns with a loaded bucket.**
- **When loading the bucket, never ram a load at high speeds and never overload the bucket.**

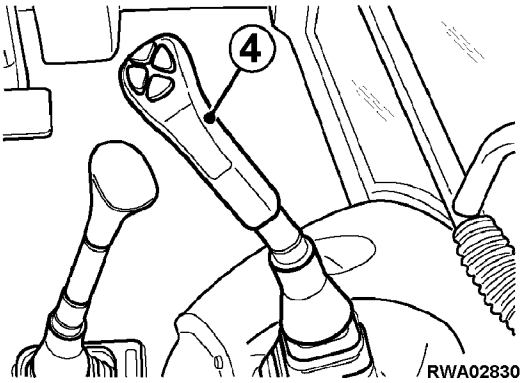
When preparing to operate the loader or backhoe, be aware of changing working conditions and the hazards involved. Always study the job carefully before starting any operations. Operate within the parameters specified in this manual. Never use this work equipment for something it was not intended, or equipment damage and operator injury may result.

Before using the loader, be sure it is (3) is unlocked. When operating the loader, remain seated with the seat belt fastened firmly around your waist. Be sure both outriggers are up and locked and the backhoe is locked and pinned. Check the work area to be sure no one is near the machine. Sound the machine's horn before beginning work.



CONTROL LEVER POSITIONS

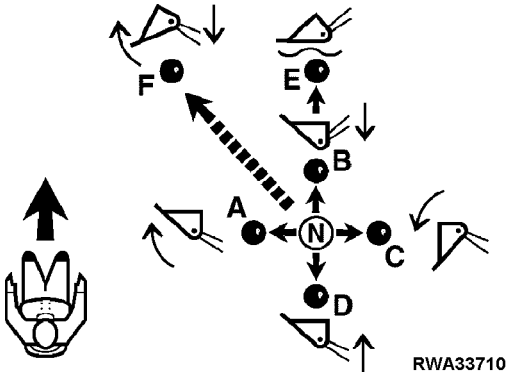
The loader control lever (4) can move many different ways. And each position has a different function.



LOADER BUCKET/ARM POSITIONS

When the control lever is moved forward or backward and at right and left angles, the bucket and arm will move in the positions indicated in the illustration.

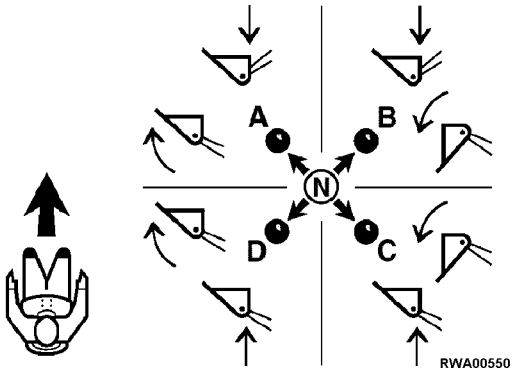
N - Neutral position (no boom or bucket movement)
A - Bucket curl back
B - Arm lower
C - Bucket dump
D - Arm raise
E - Arm in free float position
F - Self leveling (return to dig)



DUAL FUNCTIONAL BUCKET/ARM POSITIONS

When the lever is operated in the direction shown in the illustration, a dual function of the bucket and arm can be achieved.

N - Neutral position (no boom or bucket movement)
A - Arm lowering - Bucket curling
B - Arm lowering - Bucket dumping
C - Arm raising - Bucket dumping
D - Arm raising - Bucket curling



Remark

Do not use the "Arm In Free Float Position" when traveling forward, the bucket will dig in and raise the machine up. The float feature should only be used when traveling in reverse performing grading operations.

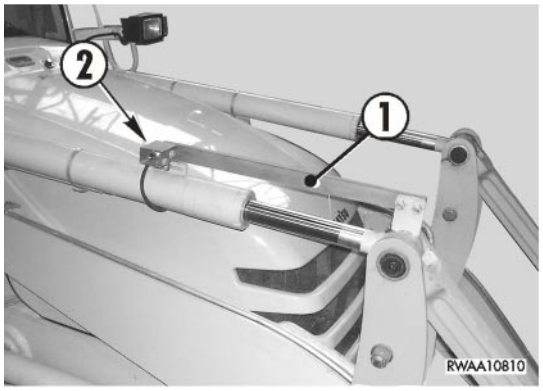
PERFORMING LOADING OPERATIONS

Before performing loading operations, familiarize yourself with the loader controls and positions. The operator must also be familiar with safety involved when performing these operations. Failure to do so may result in damage to the machine or injury to the operator.

BUCKET POSITION INDICATOR

After dumping a load, the bucket automatically returns to the horizontal position. The loader is ready to dig again when the sensor (2) does not touch the rod (1).

For adjusting the rod (1): See “ADJUST AUTOMATIC RETURN OF FRONT BUCKET TO DIG POSITION” on page 3-71.

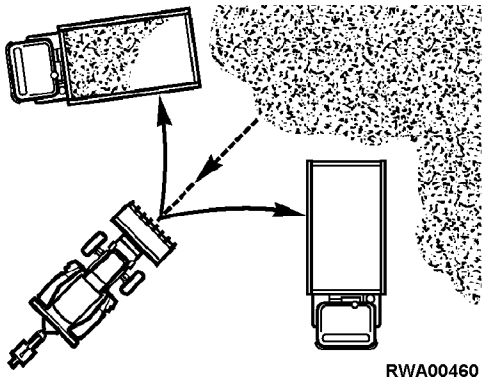


ORGANIZING THE WORK AREA

Before starting any loading operations it is important to be sure your work area is safe and clear of any obstacles or hazards that may hinder your operations, damage the equipment or cause an accident. Check the ground to be sure it is level and stable.

Study the illustration at the right of a typical loading pattern.

Before starting your operations, sound the horn, and be sure all personnel are at least 20 m (40 ft.) away from the machine and the work area.


RWA00460

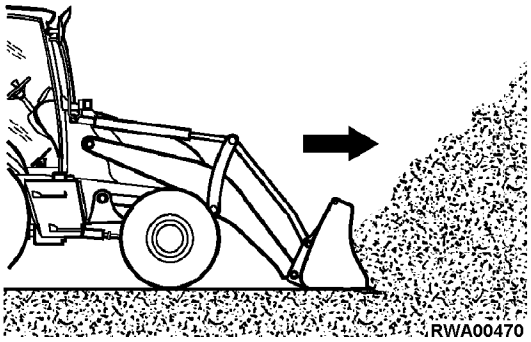
Remark

When using the declutch button during loader operations always bring the machine to a full stop before changing speed ranges.

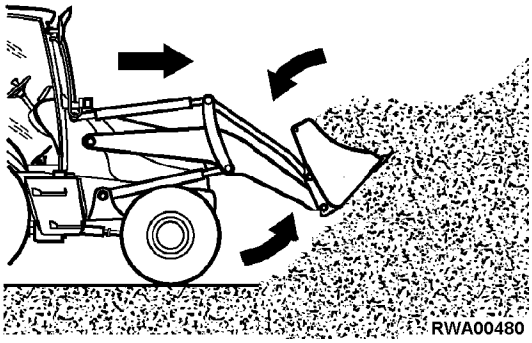
LOADING HEAPED MATERIAL

Use the following steps to efficiently load the bucket:

1. Level the bucket and set it on the ground.
2. Shift into a lower speed range.
3. Start moving into the pile from several feet away.
4. Once the bucket is into the pile, curl the bucket back while continuing to head into the pile. This action keeps the material from falling under the front of the bucket, which would lose part of the load.


RWA00470

5. Once the bucket is full, stop moving into the pile and begin raising the load while continuing to curl the bucket back.
6. Raise the arm just enough to allow the material in the bucket to fall toward the back of the bucket and level off.
7. Lower the bucket back down to approximately 50 cm (20 in.) above the ground and back out of the pile of material.
8. Proceed slowly to the point of deposit.


RWA00480

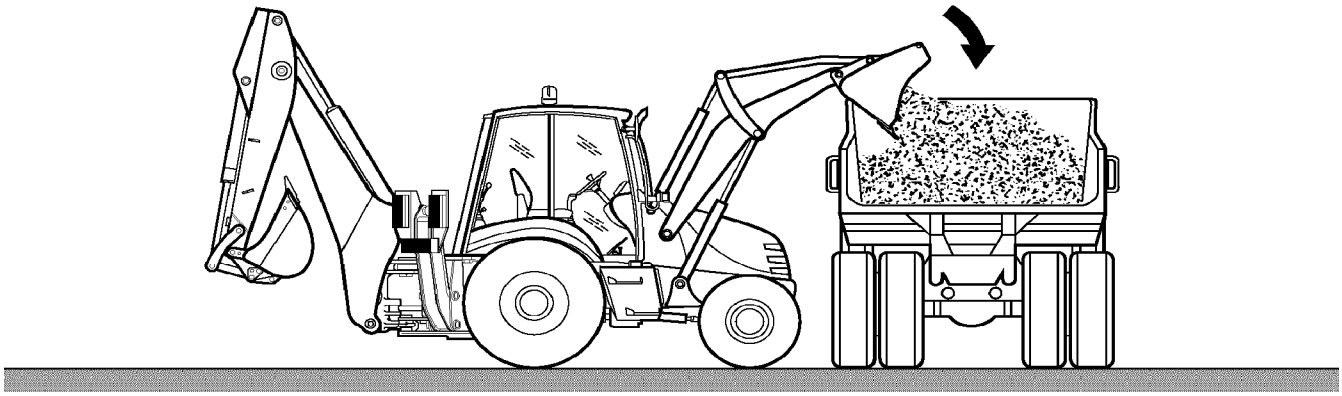
WARNING

Always travel with the load 50 cm (20 in.) from the ground. The higher the load, the higher the center of gravity, making the machine unstable and prone to rollover. Never raise the load while traveling.

LOADING A TRUCK BED OR TRAILER

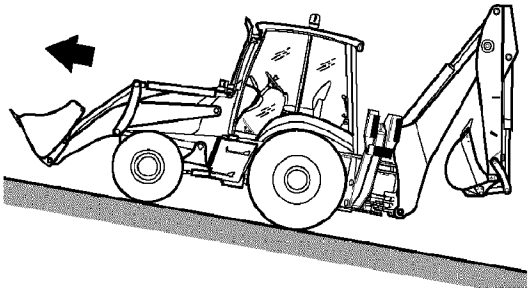
When loading a truck bed or trailer, load the front of the truck bed first. Approach the truck slowly, keeping the load as close to the ground as possible and the machine 90 degrees to the side of the truck. Once near the truck, stop, raise the load and move toward the truck slowly. Once the bucket is over the center of the truck bed, stop the machine and drop the load. Back up far enough to lower the empty bucket .

RWA04540



WORKING ON SLOPES WITH A LOADED BUCKET

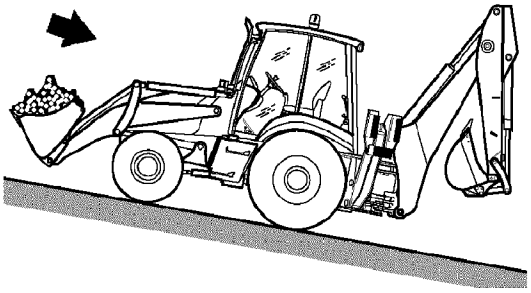
RWA04530



Working on a slope can be dangerous if basic precautions are not observed.

1. Always check the work area for snow, land slips, gravel, loose ground and anything that may suddenly modify the work conditions and stability of the machine.
2. Shift the machine into a low gear range. Do not change gear ranges or press any feature buttons while traveling up or down a slope.

CNC0019

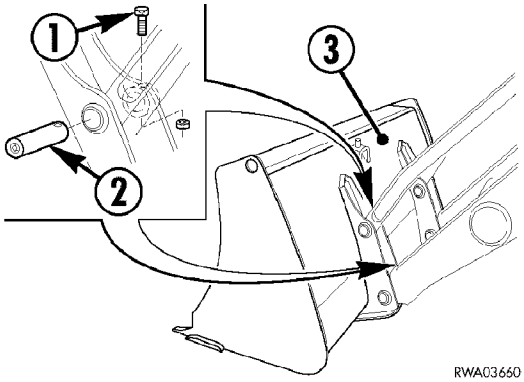


3. When traveling up the slope, the loader bucket must always point towards the top of the incline.
4. When traveling down a slope with the bucket loaded, back the machine down the incline with the loaded bucket facing the top of the incline.
5. Always keep the bucket at least 50 cm (20 in.) above the ground.
6. Never raise the bucket when traveling on a slope.
7. Never turn on a slope or travel at an angle on the slope.
8. Travel up or down the slope at a slow controllable speed.

CHANGING THE FRONT BUCKET

⚠ WARNING

Never use your fingers to align the pin or bolt holes. If hole alignment is incorrect, use a steel drift to align the parts.

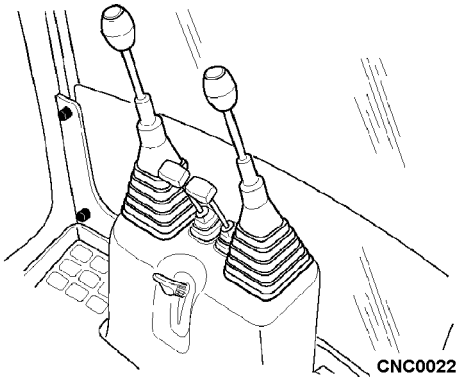


RWA03660

When changing front loader buckets always wear gloves and eye protection. To change the front bucket:

1. Position the bucket and machine on level ground.
2. Remove the bolts (1) and coupling pins (2).
3. Exchange the bucket (3).
4. Clean the pins and bushings before installing them.
5. Reinstall the bolts and tighten them in place.
6. Lubricate all pin locations.

OPERATING THE BACKHOE

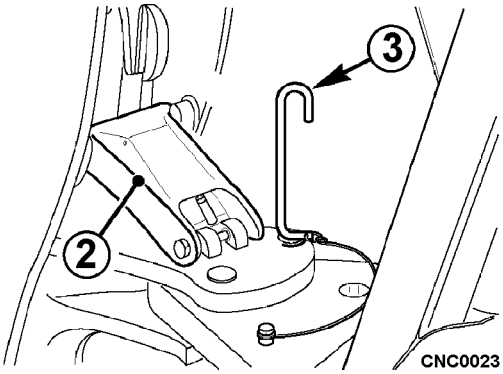


Before using the backhoe, become familiar with the backhoe controls, at right, and their positions. The operator must also be familiar with safety issues while performing these operations. Failure to do so may damage the machine, injure the operator or both.

Remark

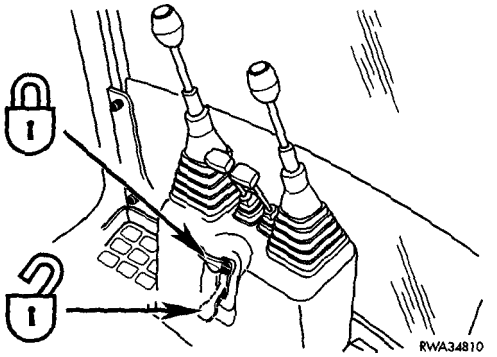
The power in the backhoe is the breakout feature when excavating or lifting. Do not use the backhoe unit to pick up, reposition, or swing the machine to the left or right. Doing so will damage the swing cylinders, tip the machine over, or both.

POSITIONING THE MACHINE



To start excavating, position the machine in a safe and clear location. Be sure there is enough room to swing or extend the boom. To start operations:

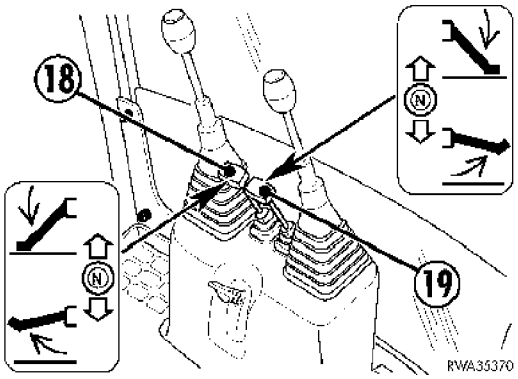
1. Rotate the seat around to the backhoe operating position and lock the seat in place.
2. Remove outrigger locks and backhoe lock pin (3). Retract the backhoe locking (2) mechanism.
3. Unlock the backhoe controls.
4. Be sure the machine directional control is set in a neutral position.



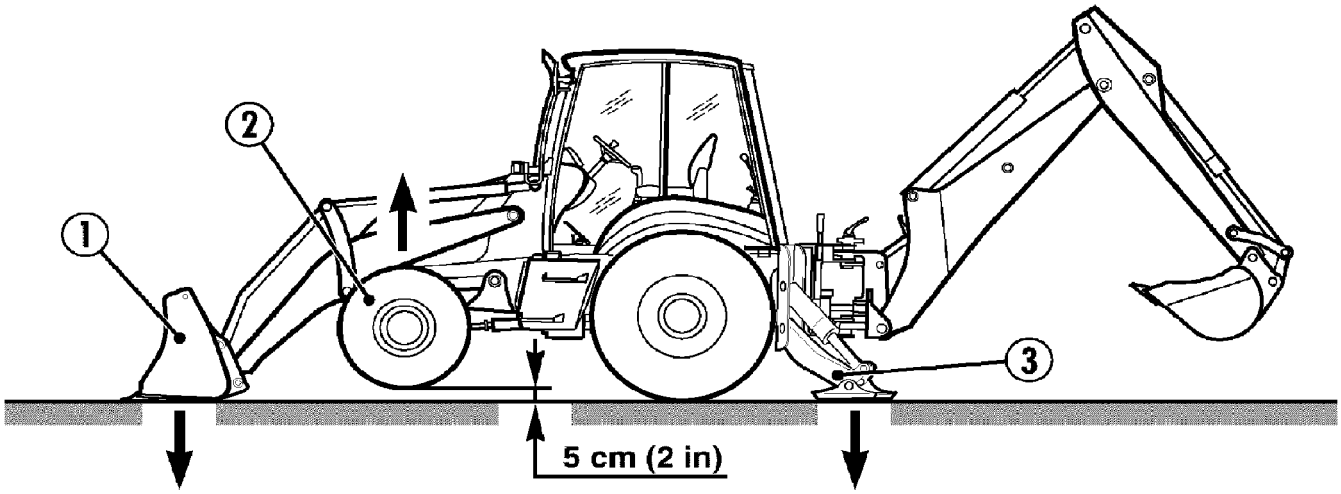
5. Always lower both outriggers before performing excavation operations. Lower both outriggers (18, 19) simultaneously so that the machine lifts evenly. Never lower the outriggers one at a time.

Remark

When retracting the outriggers, bring both outriggers up simultaneously and slowly, lowering the machine evenly.



RWA04440



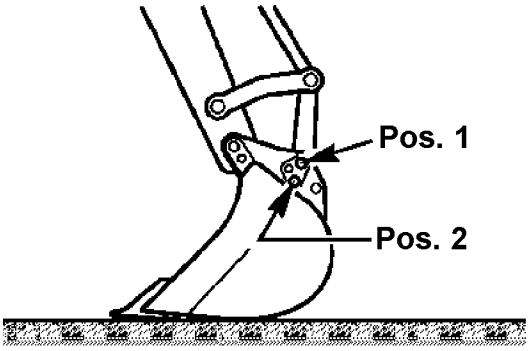
6. Set the throttle from 1,500 to 1,600 RPM.
7. Position the machine as shown in the illustration above. Lower the bucket (1) to the ground. Continue lowering until the front wheels (2) come off the ground 5 cm (2 in.). Be sure both outriggers (3) are firmly on the ground.
8. Be sure your work area and boom swing radius is clear of all obstacles. Before starting your operations, sound the horn, and be sure all personnel are at least 20 m (40 ft) away from you and your work area.
9. When you are ready to start your excavation operations, sound the horn.

ADJUSTING THE DIGGING BUCKET

Depending upon the type of excavating operations, the digging bucket can be adjusted two ways.

Pos. 1: Normal digging operations ensures more breakout power to the bucket.

Pos. 2: Suitable for operations on vertical walls, ensures the maximum movement and digging height on walls. In this position, the breakout force is reduced.



RWA00950

DIGGING METHODS

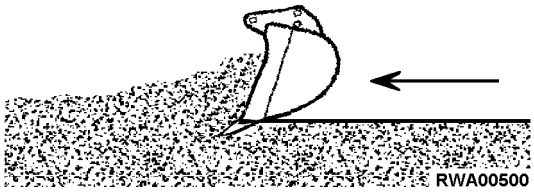
⚠ WARNING

Because the machine is capable of excavating the surface underneath the outriggers, the machine can fall into the trench.

CORRECT

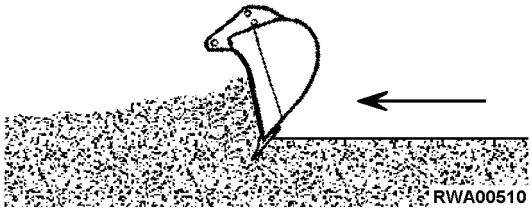
The bucket works best with its flat surface or cutting edge tipped down slightly but parallel to the ground. Begin retracting the arm while raising the boom simultaneously. Take care not to lift the machine when performing this part of the operation. Keep the bucket leading edge parallel with the surface being excavated. At the end of the stroke or when the bucket is full, curl the bucket. Keeping it level with the ground. Raise the boom and lift the arm and bucket out of the excavated site.

Once the boom is clear, swing it to the right or to the left, depending on the deposit point. Lower the boom and dump the full bucket, extending or retracting the arm if needed.



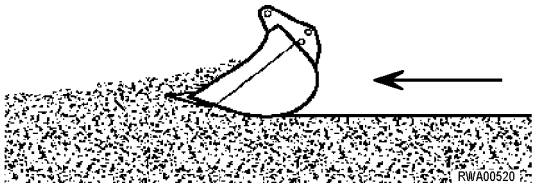
INCORRECT

The bucket is pushed down, reducing the breakout force. The bucket fills too quickly.

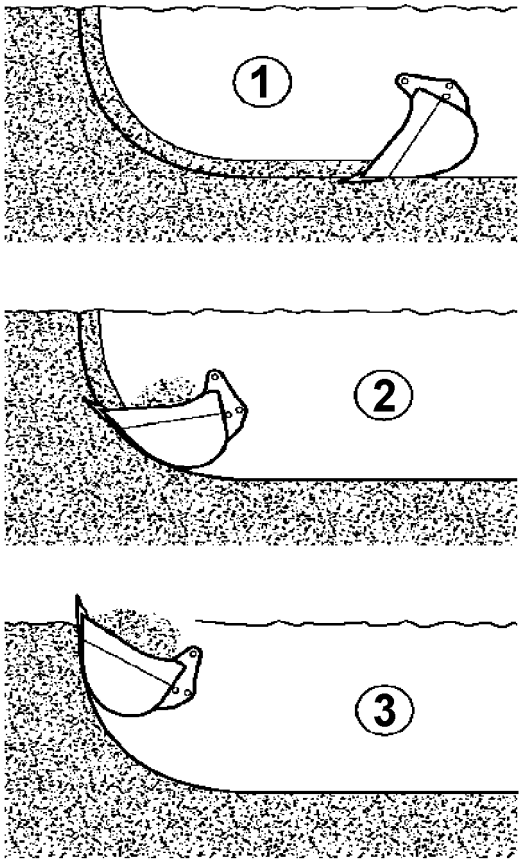


INCORRECT

The bucket is pushed upward, lifting the machine. The bucket does not fill completely.



When excavating a deep trench, simultaneously retract the arm, raise the boom and curl the bucket. Keep the leading edge of the bucket tipped down slightly, but parallel with the surface being excavated. Sequence shows the proper way to excavate a trench.



RWA00530

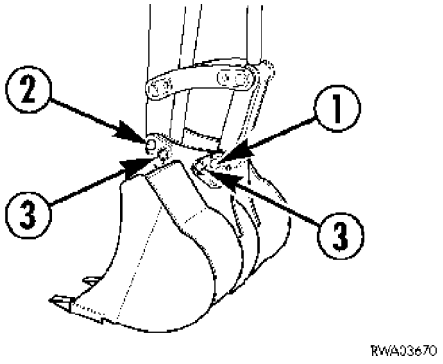
CHANGING THE BACKHOE BUCKET

⚠ WARNING

If the holes are misaligned, use a steel drift to align the parts. Never use your fingers to align the pin or bolt holes.

When changing backhoe buckets always wear gloves and eye protection. To change the bucket:

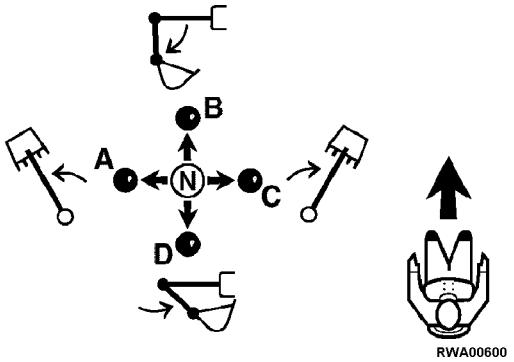
- Position the bucket and machine on level ground.
- Remove the pin (1) and the arm connection pin (2).
- Exchange the bucket taking care to completely clean the pins and bushings before installing them.
- Reinstall the safety stop (3).
- Lubricate all pin locations.



ISO BACKHOE CONTROLS

Left Wobble Stick Control Lever (single)

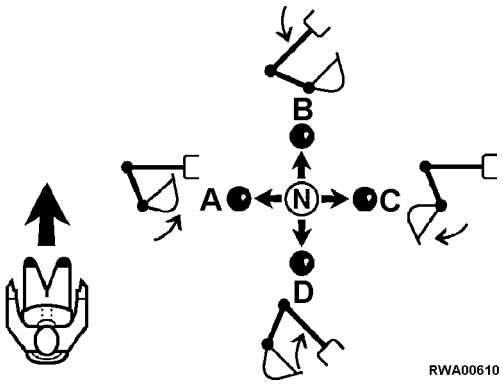
N - Neutral
A - Boom swing to the left
B - Arm extend
C - Boom swing to the right
D - Arm retract



Right Wobble Stick Control Lever (single)

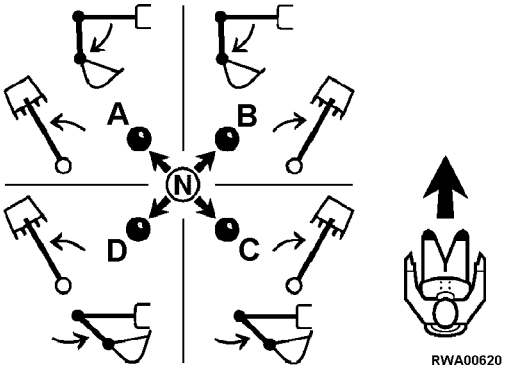
N - Neutral
A - Bucket curl
B - Boom lower
C - Bucket open
D - Boom raise

If the levers are operated in directions that are toward the machine axis, simultaneous movements proportional to the angle of inclination are obtained, since the two hydraulic cylinders corresponding to each single function are activated at the same time.



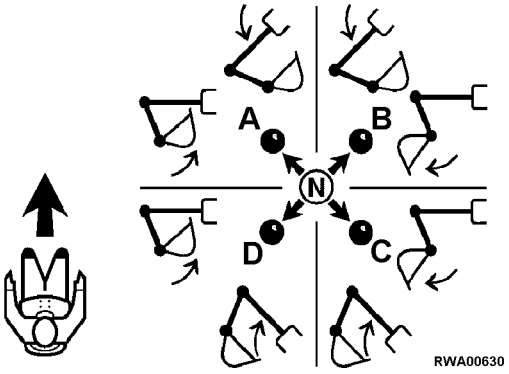
Left Wobble Stick Control Lever (combined)

N - Neutral
A - Arm extend - Boom swing left
B - Arm extend - Boom swing right
C - Arm retract - Boom swing right
D - Arm retract - Boom swing left



Right Wobble Stick Control Lever (combined)

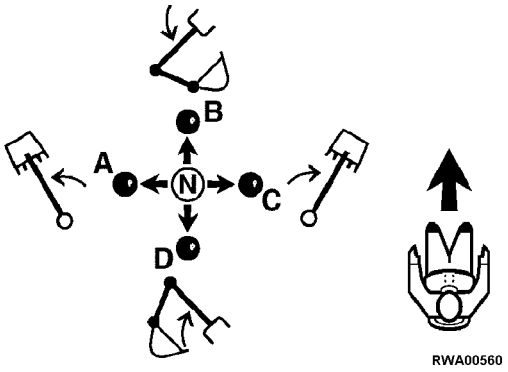
N - Neutral
A - Boom lower - Bucket curl
B - Boom lower - Bucket open
C - Boom raise - Bucket open
D - Boom raise - Bucket curl



KOMATSU BACKHOE CONTROLS

Left Wobble Stick Control Lever (single)

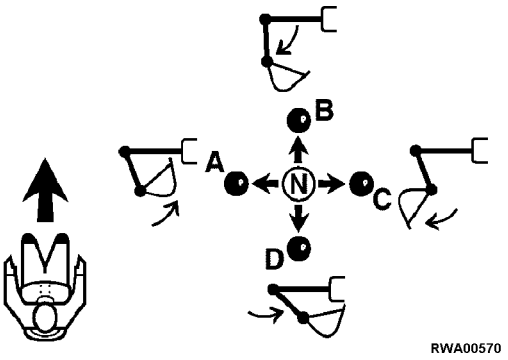
N - Neutral
A - Boom swing to the left
B - Boom lower
C - Boom swing to the right
D - Boom raise



Right Wobble Stick Control Lever (single)

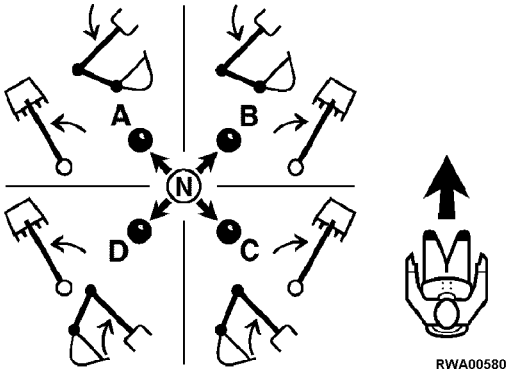
N - Neutral
A - Bucket curl
B - Arm extend
C - Bucket open
D - Arm retract

If the levers ar operated in directions that are toward the machine axis, simultaneous movements proportional to the angle of inclination are obtained, since the two hydraulic cylinders corresponding to each single function are activated at the same time.



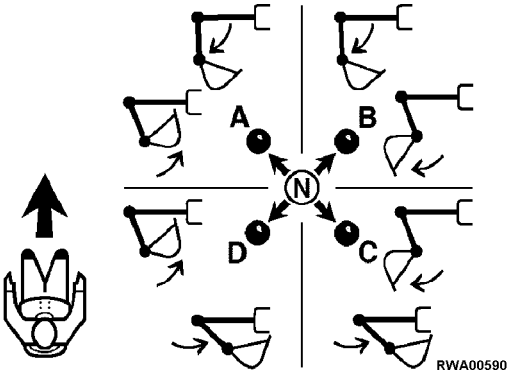
Left Wobble Stick Control Lever (combined)

N - Neutral
A - Boom lower and swing to the left
B - Boom lower and swing to the right
C - Boom raise and swing to the right
D - Boom raise and swing to the left



Right Wobble Stick Control Lever (combined)

N - Neutral
A - Arm extend - Bucket curl
B - Arm extend - Bucket open
C - Arm retract - Bucket open
D - Arm retract - Bucket curl



TRAVELING

Before traveling or moving the machine, it is important to know all the control functions and relevant safety regulations for the area you will be traveling or moving the machine in. If you will be traveling on state or local roadways, observe all traffic safety laws. Travel at a safe controllable speed.

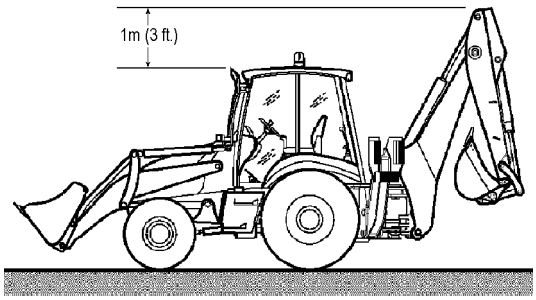
⚠ WARNING

If the machine starts to rock forward and backward while traveling, slow the machine down to reduce or stop this action. Failing to do so may result in loss of machine control.

The operator must be seated with the seat belt fastened snugly around the waist. Position the seat so that you are able to see all areas around you and can access all controls.

The proper travel posture for the machine requires the backhoe and both outriggers fully retracted and locked in place. And the bucket about 50 cm (20 in.) above the ground.

RWA04480



⚠ WARNING

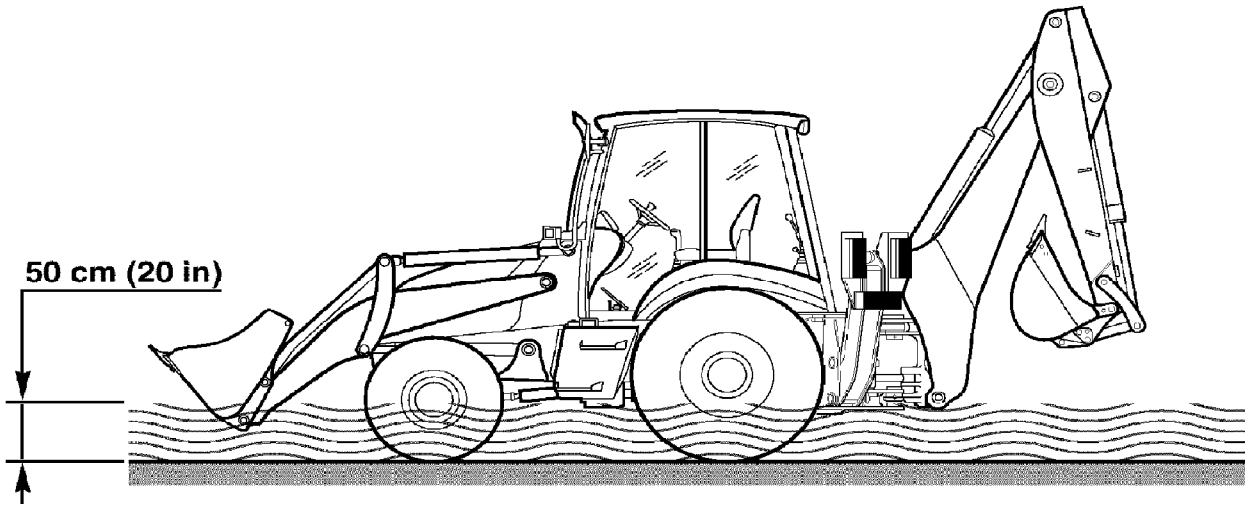
A section of the backhoe boom is 1m (3 ft.) above the canopy. The operator cannot see that section of the backhoe boom when the machine is in the travel posture.

Be sure both brake pedals are locked.

TRAVELING OR WORKING IN WATER

Before working in areas where the machine will be partially immersed in water, always check the depth of the water, stability of the ground, and current flow. Do no operate the machine in water deeper than 50 cm (20 in.). If the machine is in water deeper than 50 cm (20 in.), damage to the machine may result.

RWA04410



After working or traveling through water or muddy areas, always clean the machine and lubricate any components that may have been immersed in the mud or water.

MAINTENANCE

MAINTENANCE GUIDE

- Before opening the engine hood, engage the safety locks of both the front loader and backhoe.
- If it is necessary to check the hydraulic oil level in the reservoir, place the machine in the transport position. Only perform operations on firm and level ground and after applying the parking brake.
- Use Komatsu genuine oils and greases; choose oils suitable for the ambient temperature.
- Use clean oils and greases. Keep the oil and grease containers clean. Keep any foreign matter away from oils and greases.
- Always keep the machine clean. A clean machine is easier to repair. Keep the grease fittings, the breathers and the areas near the openings of the fluid level checks clean. Keeping the fluid openings clean prevents any impurities from getting into the fluids.
- Draining hot oil or coolant immediately after stopping the engine is hazardous. Wait for the engine to cool down to at least 40° to 50° C (104° to 122° F) before draining hot liquids.
- After changing the oil or the oil filters, check if metal particles are present. If large quantities of metal particles, contact your Komatsu dealer.
- Check and change the oil in clean locations to prevent any impurities from getting into the tank or container.
- Before performing any maintenance operation, hang the warning plates on the ignition switch, control levers, and cab doors, to prevent anyone from starting the engine by mistake.
- When performing maintenance operations, always take the precautions indicated on safety plates applied on the machine.
- Instructions for are welding.
  1. Turn ignition key to the OFF position.
  2. Disconnect the battery (first negative pole and then positive pole).
  3. Disconnect the electrical connections at the alternator.
  4. Do not apply more than 200V continuously.
  5. Connect the ground cable within 1 mm (0.039 in.) from the point of welding.
  6. Avoid placing gaskets and bearings between the welding area and the ground cable.
- Do not use flammable fluids to clean the machine parts. Keep exposed flames and lit cigarettes away from these fluids.
- After removing the O-rings and gaskets, clean the sealing surfaces. And then install new O-rings and gaskets when reassembling.
- Avoid keeping loose objects or tools in your pockets. Tools may fall out and drop into the machine while working on it.
- When washing the machine, do not direct high-pressure water onto the radiator and heat exchanger.
- When washing the machine, protect the electrical connectors and avoid getting the ignition switch wet.
- Before starting work in mud, in rain, on seashores, or river banks, perform general lubrication.Wash the machine immediately after work to protect the components from rust. Lubricate the equipment more frequently than usual.
- When working at dusty work sites, proceed as follows:
  1. Check the air cleaner for any clogging; clean it more frequently than usual.
  2. Clean the radiator and the heat exchanger frequently to prevent the fins from clogging with debris.
  3. Change the oil filter more frequently than usual.
  4. Clean the electrical components, especially the starter and the alternator, to avoid any accumulation of dust.
- Never mix oils of different brands. Thus, do not top off with any oil different from the oil used in the machine. If a different oil brand is desired, drain all the oil and then fill the tank with the new brand of oil.

⚠ WARNING

Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to the regulations in force.
Some components contain combustible material, which may become extremely dangerous if it burns. For this reason, avoid any contact of burnt material with your skin or eyes and do not inhale fumes.

PRECAUTIONS DURING SEASONAL CHANGES

Where severe temperature changes are expected, take preventive measures to limit any damage resulting from extremely low or extremely high temperatures.

COLD WEATHER

At the end of the day, perform the following steps to prevent any future problems.

- Remove any mud or water from the machine and its undercarriage.
- Park the machine in a protected area if possible.
- Drain any condensation from filters and water traps.
- If possible, remove the battery and store in a warmer location if temperatures will be extremely cold.
- Always allow the machine time to warm up during cold seasons.

FUEL AND LUBRICANTS

- In colder climates, use winterized fuel DSTM D975 N 1 when ambient temperature is below -10° C (14° F). Do not mix gasoline with diesel fuel. This will damage the fuel system.
- Change the engine oil, using a viscosity oil for the climate.

COOLANT

The required standards for permanent antifreeze are SAE-J1034 and Federal Standard O-A-548D. Never mix antifreezes or add additives to the cooling system.

Remark

Never use flammable liquids in the cooling system.

BATTERY

When ambient temperatures decrease, the battery capacity decreases accordingly. If the battery charge is low, the electrolyte may freeze. Keep the battery completely charged and insulated to protect it from low temperatures.

⚠ WARNING

To avoid explosions, do not create sparks, smoke or have open flames near the battery.

To Measure The Specific Gravity Of The Electrolyte Refer To The Following Table.

Percentage Of Charge	Electrolyte Temperature			
	20° C (68° F)	0° C (32° F)	-10°C (14° F)	-20° C (-4° F)
100%	1.28	1.29	1.30	1.31
90%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

WARM WEATHER

At the end of the cold season, change the lubricants and fuel specified for the expected temperature increase. Make sure the fan belts are in good condition and the radiator fins are clean.

In areas where road salt is used during the winter, thoroughly wash your machine to remove these corrosive deposits.

The required standards for permanent antifreeze are SAE-J1034 and Federal Standard O-A-548D. Be sure the coolant anti-freeze is at the proper lever and setting for the climate. See “CHANGE THE COOLANT” on page 3-59.
Never mix antifreezes or add additives to the cooling system.

Remark

Never use flammable liquids or “water only” in the cooling system.

BASIC TROUBLESHOOTING

If the problem or failure is not listed in the troubleshooting section, contact your Komatsu Dealer immediately and have them check the problem.

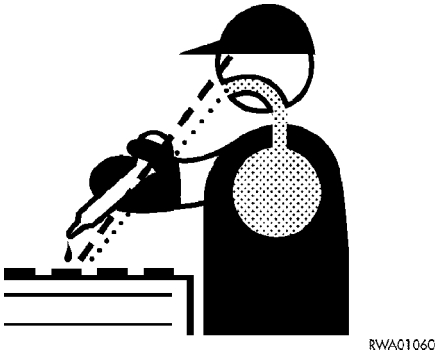
THE BATTERY

⚠ WARNING

When checking or handling the batteries, stop the engine and turn the ignition switch to the OFF position before making repairs. Before starting the engine, use a damp cloth to wipe off the dust accumulated on the top surface of the battery. Because the battery generates hydrogen gas, a possibility of explosion exists. Do not bring lighted cigarettes near the battery or do anything that will cause sparks. Battery electrolyte is dilute sulfuric acid and it will attack your clothes and skin. If battery acid gets on your clothes or on your skin, immediately wash off the battery acid with large quantities of water. If battery acid gets in your eyes, flush your eyes with large quantities of fresh water and consult a doctor immediately. When handling batteries, always wear protective goggles and rubber gloves.

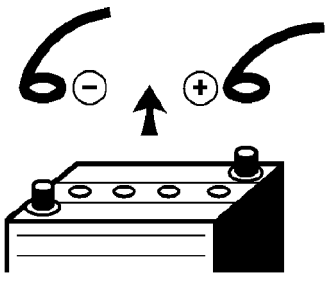
SERVICING THE BATTERY

If battery tops are dirty, clean with diluted baking soda and warm water solution. Before charging or servicing the battery, disconnect the cable from the negative terminal of the battery. The unusually high voltage will damage the alternator. While charging the battery to avoid gas explosions, cover the battery caps with rags soaked in a baking soda solution. If electrolyte temperatures exceeds 45° C (113° F), stop charging the battery. Turn off the charger as soon as the battery is charged. Overcharging the battery may cause overheating, decreasing the quantity of electrolyte, buckling the plates, or both. Add distilled non-mineral based water when the battery is low. Do not over fill the battery. Always wear protective clothing when servicing the battery.


RWA01060

REMOVAL AND INSTALLATION

When removing the battery, first disconnect the cable from the negative terminal. If a tool touches a cable connecting the positive terminal and the chassis, there is a danger of sparks. When installing the battery, the ground cable should be connected to the ground terminal as the last step. the illustration below shows the proper removal and installation order.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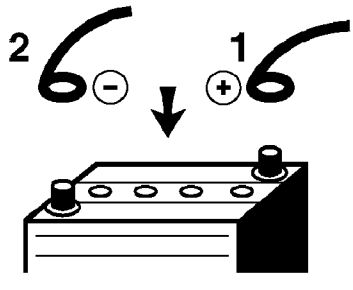
INSTALLATION



RWA01700

ELECTRICAL CIRCUITS

Trouble	Possible Cause	Remidy
Lights do not work satisfactory even with the engine running at high RPMs:	• Faulty cables. • Poor fan belt tension.	• Check and repair terminal connections. • Adjust fan belt tension. (See "EVERY 250 HOURS")
Lights come on intermittently with the engine running:		
Alternator charge indicator does not go out with the engine running and engine speed is increased:	• Faulty alternator. • Faulty cables.	• Replace alternator. • Check and repair cables.
Alternator is very noisy:	• Defective alternator.	• Replace alternator
Starter does not operate when the ignition key is turned to the "START" position:	• Faulty cables. • Low battery charge. • Blown engine start fuse.	• Check condition of cables. • Check battery charge state. • Replace fuse and check system.
Starter drive chatters:	• Low battery charge.	• Check battery charge state.
Starter cranks slowly:	• Faulty cables. • Battery charge insufficient.	• Check condition of cables. • Charge the battery.
Starter cuts out while cranking the engine:	• Faulty cables. • Battery charge insufficient.	• Check condition of cables. • Charge the battery.
Engine oil pressure light does not work with the ignition key in the "ON" position and the engine not running:	• Bad bulb. • Defective pressure sensor.	• Replace bulb. • Replace sensor.
Alternator light does not work with the ignition key in the "ON" position and the engine not running:	• Bad bulb. • Faulty cables.	• Replace bulb. • Check condition of cables.

HYDRAULIC SYSTEM

Trouble	Possible Cause	Remidy
Pump is very noisy:	• Low oil in tank. • Faulty pump. • Incorrect hydraulic fluid.	• Add oil. • Repair or replace. • Change hydraulic oil.
Equipment control levers do not return to the neutral position:	• Broken return spring or sized spool.	• Replace spring or check condition of valve body
Work equipment moves very slow	• Faulty pump. • Pressure valve defective or stuck. • Dirty drain filter.	• Repair or replace. • Calibrate or replace. • Replace.

BRAKING SYSTEM

Trouble	Possible Cause	Remedy
Braking irregular for both wheels:	• Worn brake disks. • No fluid in master cylinder. • Air in braking system.	• Replace. • Top off and purge system. • Purge the system.
Braking not regular on one side only:	• Air in braking system. • Brake disk worn.	• Purge the system. • Replace.

TORQUE CONVERTER SYSTEM

Trouble	Possible Cause	Remedy
Low pressure in clutch:	• Oil level. • Clutch pressure adjusting valve stuck open. • Faulty delivery pump. • Worn clutch shaft or piston rings. • Clutch pump stuck open.	• Top off. • Clean element and seat. • Replace. • Replace rings. • Clean.
Pump delivery insufficient:	• Oil level. • Suction filter clogged. • Faulty pump.	• Top off. • Clean filter. • Replace.
System overheating:	• Damaged rings. • Faulty pump. • Oil level. • Dirty heat exchanger. • Damaged heat exchanger.	• Dissemble and clean. • Replace. • Top off. • Clean. • Replace.
Noisy converter:	• Faulty pump. • Damaged bearings.	• Replace. • Remove and replace.
Lack of power:	• Low engine RPM causing stall. • Overheating.	• Check engine. • See overheating remedies.

ENGINE

Trouble	Possible Cause	Remedy
Oil pressure light remains ON at high idle:	• Oil level too low. • Oil filter plugged. • Incorrect oil for the season.	• Top off. • Change oil and filter. • Change oil.
Cooling system overheating:	• Coolant low due to leaks. • Fan belt slipping. • Cooling system blocked. • Radiator fins damaged. • Faulty thermostat. • Radiator cap defective.	• Top off and repair. • Check belt tension. • Flush cooling system. • Repair or clean. • Replace. • Replace.
Temperature gauge stuck at “H”	• Faulty temperature indicator.	• Replace.
Temperature does not show proper gauge reading:	• Faulty thermostat. • Faulty gauge.	• Replace. • Replace.
Engine cranks but will not start:	• No fuel. • Air in fuel system. • Low compression.	• Refuel. • Bleed system. • Adjust valve clearance.
White or light blue exhaust gasses:	• Too much oil in oil pan. • Unstable fuel.	• Correct the oil level. • Change to suitable fuel.
Exhaust gasses are black:	• Air cleaner clogged. • Faulty injectors or injection pump. • Low compression.	• Clean or replace. • Replace. • Adjust valve clearance.
Popping noise heard at exhaust stack:	• Faulty injectors.	• Replace injectors.
Abnormal engine noise:	• Improper fuel Cetane rating. • Overheating. • Damaged exhaust muffler. • Excessive valve clearance.	• Change fuels. • See “temperature indication” • Replace. • Adjust valves.

MAINTENANCE NOTES

- Use only Komatsu genuine replacement parts.
- Do not mix different oil types.
- Unless specified otherwise, authorized oils and coolant by Komatsu are as follows:

Item	Specifications
• Engine oil	SAE 10W-30 API classification CD
• Hydraulic system oil	SAE 10W-30 API classification CD
• Hydraulic oil Environmental Ester Synthetic (HEES) Only for machines that use synthetic, biodegradable hydraulic oil.	PAKELO GEOLUBE HYDRAULIC EP-46
• Hydraulic transmission oil	GM DEXRON® II D
• Axle oil (front and rear)	SHELL:DONAX TD CALTEX:RPM TRACTOR HYDRAULIC FLUID CHEVRON:TRACTOR HYDRAULIC FLUID TEXACO:TEXTRAN TDH OIL MOBILEMOBILFLUID 422 or 424
• Brake system oil	GM DEXRON® II D
• Fuel	Ambient temperature above -10° C (14° F): ASTM D975 no. 2 diesel oil
	Ambient temperature below -10° C (14° F): ASTM D975 no. 1 diesel oil
• Radiator coolant	Permanent, ethylene glycol-based antifreeze, with corrosion inhibitor for protection down to -36° C (-33° F)

GM DEXRON II® D (GM DEXRON® is a registered trademark of General Motors Corporation)

NOTES REGARDING THE ENGINE

ENGINE OIL

- Select the engine oil carefully because it is the lifeblood of the engine.
  1. Check the oil level daily.
  2. Analyze the oil condition periodically.
  3. Change the engine oil at the prescribed intervals.

COOLANT

- Engine coolant serves to keep the engine at the optimal temperature. Therefore, check the coolant level in the expansion tank daily, and add if necessary.
- The ratio of antifreeze to water depends on the minimum temperature where the machine is operating.
- Use the following table:

Quantity Of Antifreeze To Be Added To The Water										
Minimum ambient temperature	° C	-4	-6	-9	-12	-16	-20	-26	-32	-36
	° F	25	21	15	10	3	-4	-15	-26	-33
Quantity of antifreeze	Liter	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7
	US gal	0.37	0.55	0.74	0.92	1.11	1.29	1.48	1.66	1.85
Quantity of water	Liter	12.6	11.9	11.2	10.5	9.8	9.1	8.4	7.7	7
	US gal	3.33	3.15	2.96	2.78	2.59	2.41	2.22	2.04	1.85

- Use water that has low mineral content (soft water).
- Do not use corrosion inhibitors containing soluble oil because it damages the rubber couplings.
- In case of doubt, contact your Komatsu Dealer.

FUEL

- Always use fuel suitable for the temperature. Incorrect fuels may damage the engine or reduce its power.
- Always refuel at the end of the work day.
- When refueling, make sure that there is no water on the fuel drum cover. And do not draw condensation from inside the bottom of the drum.
- If the fuel runs out, or if the fuel filter has been replaced, bleed the fuel system.

NOTES REGARDING THE HYDRAULIC SYSTEM

- Be extremely careful when performing maintenance on the hydraulic system, since the oil is very hot.
  The system is pressurized not only during work, but also at the end of work.
- The maintenance operations required for the hydraulic system are the following:
  1. Check the oil level in the tank daily.
  2. Change the hydraulic oil filter at the prescribed interval.
  3. Change the hydraulic oil and clean the suction filter at the prescribed interval.
- Always bleed (purge) the system after changing the oil filter and the oil.
- When a component is removed from the circuit, check the gaskets and O-rings and change them if they are damaged.
- When removing a cylinder or a hydraulic component, bleed the hydraulic system after reassembly:
  1. Start the engine and let it idle.
  2. Make all the cylinders perform from 4 to 5 movements, stopping them at about. 100 mm (4 in.) from the end of their stroke.
  3. Slowly make all the cylinders reach the end of their stroke from 3 to 4 times.

NOTES REGARDING THE ELECTRICAL SYSTEM

- If the cables are wet or their insulating material is damaged, the electrical system may short, and may result in machine malfunctions.
- The maintenance operations required for the electrical system are the following:
  1. Check the alternator belt tension.
  2. Check the alternator belt for damage or breakage.
  3. Check the battery electrolyte level.
- Do not remove or eliminate any electrical component installed on the machine and do not install any electrical component with characteristics different from those specified and approved by Komatsu.
- Be careful to keep the electrical system dry.
- When working on seashores or river or lake banks, protect the jack plugs from corrosion.
- Do not connect any optional electrical device to the fuses, ignition switch, battery, relays, etc. For the installation of any optional equipment, contact your Komatsu Dealer.
- If any electric welding needs to be done, disconnect the battery and the alternator before welding.

NOTES REGARDING LUBRICATION

- Perform lubrication with specified grease or oil, according to the ambient temperature.
- The maintenance operations required for the components that need lubricating are the following:
  - Check the fluid and lubricant levels.
  - Change the oil at the recommended intervals.
  - Inject grease through the grease fittings.
- Always clean the grease fittings before injecting grease and remove any excess grease after lubrication.
- Keep the lubricants at the correct levels; avoid excessive or insufficient quantities.

NORMAL WEAR PARTS

- The parts subject to wear — filters, bucket teeth, etc. — must be replaced according to the periodic maintenance intervals prescribed or when worn to the wear limit.
- The timely change of these parts prevents unwanted downtime of the machine.
- Use only Komatsu genuine parts to assure reliability.

Item	Description	Qty	Change Interval
Hydraulic oil filter	Cartridge	1	Every 500 hours
Engine oil filter	Cartridge	1	Every 500 hours
Fuel filter	Cartridge	1	Every 500 hours
Converter oil filter	Cartridge	1	Every 1000 hours
Air cleaner	Main cartridge Safety cartridge	1 1	When required When required
Front bucket	Tooth Screw Nut	AR AR	- -
Backhoe bucket	Center tooth Screw Nut Right tooth Left tooth Screw Side screw Nut	AR AR AR 1 1 AR 4 AR	- - - - - - - -

FUEL, COOLANT, AND LUBRICANTS

SELECTION ACCORDING TO AMBIENT TEMPERATURE

Reservoir	Kind of fluid	Ambient Temperature									Capacity	
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122° F 50° C	Specified	Refill
Engine oil pan	Oil API CD	**SAE 5W-30**									7.9 liter (2 US gal)	7.9 liter (2 US gal)
			SAE 10W									
				SAE 20W-20								
					SAE 30							
						SAE 40						
					SAE 10W-30							
				SAE 15W-40								
Hydraulic system with organic hydraulic oil		**SAE 5W**									150 liter (39.6 US gal)	92 liter (24.3 US gal)
			SAE 10W									
					SAE 30							
					SAE 10W-30							
Hydraulic system with HEES											150 liter (39.6 US gal)	92 liter (24.3 US gal)
					See page 3-17							
Front axle: Differential											6.5 liter (1.7 US gal)	6.5 liter (1.7 US gal)
Final reduction gear (ea.)					**(See Note 1)**						1 liter (0.26 US gal)	1 liter (0.26 US gal)
Rear axle: Differential											14.5 liter (3.8 US gal)	14.5 liter (3.8 US gal)
Final reduction gear (ea.)											1.5 liter (0.4 US gal)	1.5 liter (0.4 US gal)
Hydraulic transmission	GM DEXRON II D										20 liter (5.3 US gal)	17 liter (4.5 US gal)
Brake system											0.8 liter (0.2 US gal)	0.8 liter (0.2 US gal)

Reservoir	Kind of fluid	Ambient Temperature									Capacity	
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122° F 50° C	Specified	Refill
Fuel tank	Diesel fuel		**ASTM D975 No. 1**								130 liter (34.4 US gal)	-
					ASTM D975 No. 2							
Engine cooling system	Coolant										14 liter (3.7 US gal)	-

GREASE

Lubrication Points	Consistency	Type
Articulations, grease fittings	NLGI 2	(See note 2)

Note 1:For axle oil, use only the oils listed below.

SHELL: DONAX TD
CALTEX: RPM TRACTOR HYDRAULIC FLUID
CHEVRON:TRACTOR HYDRAULIC FLUID
TEXACO: TEXTRAN TDH OIL
MOBIL: MOBILFLUID 422 or 424

Note 2:The recommended lubricating grease is No.2 multipurpose lithium grease with 3% molybdenum disulfide (Lithio EP + MoS2).

Remark

When fuel sulphur content is less than 0.5%, change the oil according to maintenance hours described in this manual. If fuel sulphur content is above 0.5%, change the oil according to the following table.

Fuel sulphur content	Engine oil change interval
0.5 to 1.0%	two times equally spaced during the normal scheduled interval instead of once
Above 1.0%	four times equally spaced during the normal scheduled interval instead of once

- When the temperature is lower than 0° C (32° F), use SAE10W, SAE20W-20 or SAE10W-30 engine oil.
- Use API classification CD engine oil.
- Use Komatsu genuine oil, which has been specifically formulated and approved for use in the engine, hydraulic work equipment, transmission, axles, and brakes.

Specified capacity: Total amount of oil including oil for components and oil in piping.
Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material
SAE: Society of Automotive Engineers
API: American Petroleum Institute

No.	Supplier	Engine Oil API CD, CE, or CF-4	Transmission Oil GM Dexron II C4 Allison C4	Grease LI, EP, MoS_2	Antifreeze (Permanent type)
1	KOMATSU	Premium multigrade Engine Oils PM701 SAE 10W-30 SAE 15W-40	Komatsu PM704 (1902) Dexron® III	Komatsu Super Grease NLGI 2 PM706 ASTM D 128	----
2	AMOCO	Amoco 300 SAE 15W-40	Dexron II ATF	Molylith grease 2	Ready Antifreeze
3	ARCO	Arcofleat S3 Plus SAE 15W-40 Hy-Vis HD extra S3 plus SAE 15W-40	ATF Dexron II	Litholine HEP 2	Sincol-Blu (-40° C / -40° F)
4	BP	Vanellus C3 SAE 15W-40 Vanellus C3 Extra SAE 15W-40	Autran MBX	Grease LTX2-M	Sigil Fluid (-40° C / -40° F)
5	CALTEX	RPM Delo 500 RPM Delo 600 RPM Delo SPH	ATF-HD	Molytex EP2	AF eng. coolant CX eng. coolant
6	CASTROL	Turbomax RX super	TQ - Dexron II	Spheerol LMM	Antifreeze (pure)
7	CHEVRON	RPM Delo 400 RPM Delo 500	Supreme Automatic Transmission Fluid	Moly grease	Flurant
8	CITGO	---	D-21571	---	---
9	CONOCO	Fleet motor oil SAE 15W-40	D21718 D21570	---	Fleet Heavy Duty
10	EXXON (ESSO)	Essolube TD SAE 15W-40 Heavy Truck Diesel Motor Oil SAE 15W-40	ATF Dexron II D D-21849 (East Canada) D-21848 (West Canada)	MP Grease Molly	All-season coolant
11	GULF	Super Duty SAE 15W-40 Super Duty plus SAE 15W-40	---	Gulfcrown EP2 Gulfcrown EP sp.1	Antifreeze and coolant
12	MOBIL	Delvac 1300 Super SAE 15W-40 Delvac 1200 Super SAE 15W-40 Delvac 1300 Super SAE 10W-30	ATF 220	Mobilgrease sp.1	---

No.	Supplier	Engine Oil API CD, CE, or CF-4	Transmission Oil GM Dexron II C4 Allison C4	Grease LI, EP, MoS_2	Antifreeze (Permanent type)
13	PENNZOIL	Supreme duty fleet SAE 15W-40	Pennzoil ATF	Multipurpose white grease 705 707L white-bearing grease	Antifreeze and summer coolant
14	SHELL	Rimula Super SAE 15W-40 Myrina X SAE 15W-40 Rotella T SAE 10W-30	Donag TG (Dexron II)	Alvania EP grease MP MOS (Can.) Retinax AM (Korea)	Shellzone all-season antifreeze
15	SUN	---	---	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco antifreeze and summer coolant
16	TEXACO	Ursa Super TD SAE 15W-40 Ursa Super LA SAE 15W-40	Havoline ATF Dexron II Texamatic 7045 (9226)	Molytex EP2	---
17	UNION	Guardol	D21460	Unoba EP	---

HEES — SYNTHETIC, BIODEGRADABLE HYDRAULIC OIL

Our machines can be filled with HEES. Thus, use of oils indicated in the following table is authorized and recommended:

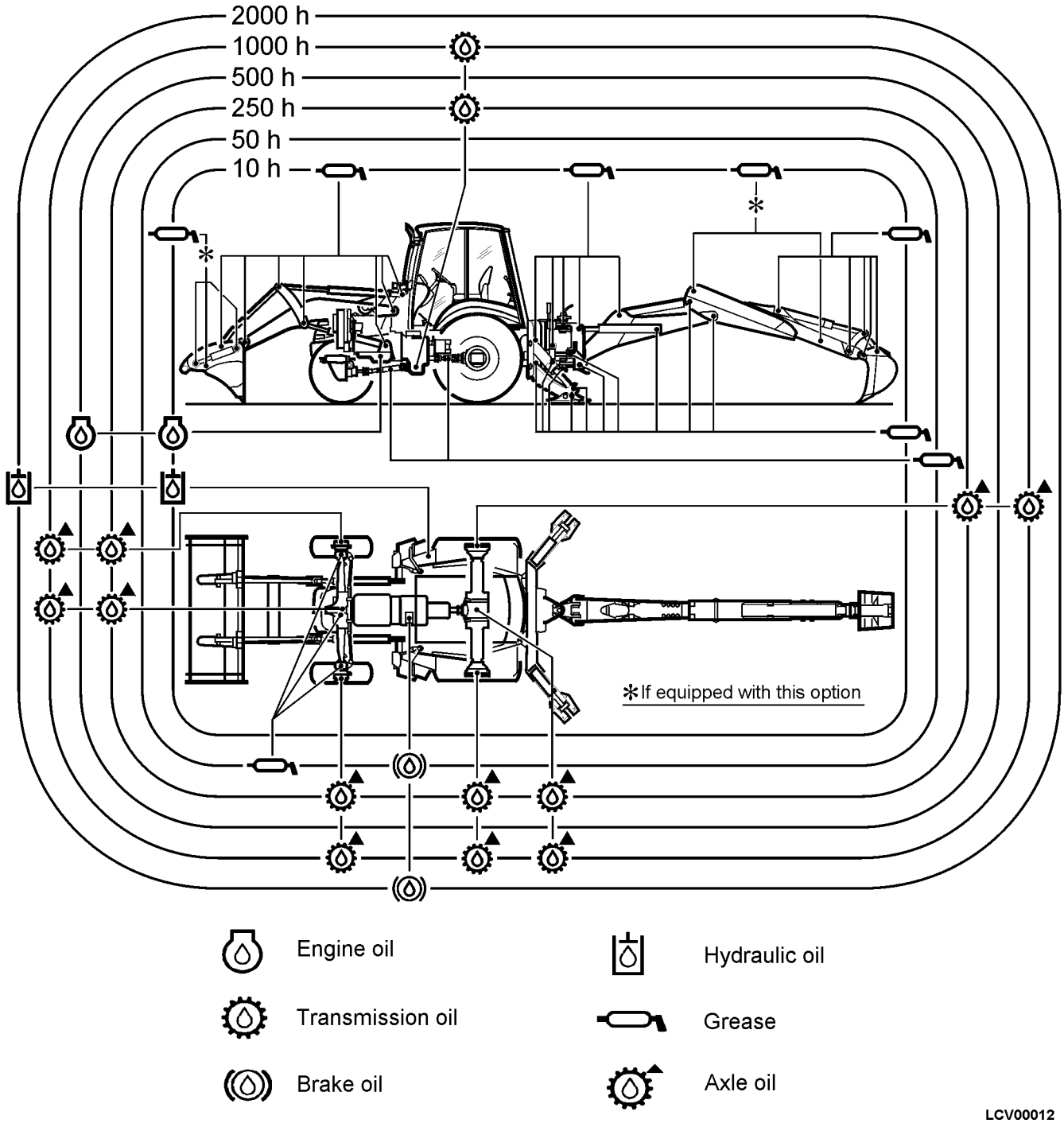
Supplier	HEES — Synthetic, Biodegradable Oil
KOMATSU	---
AGIP	ARNICA S 46
ARAL	HEF 46 vitam
AVIA	SYNTOFLUID N 46
BP	BIOHYD SE-S 46
CONDAT	CONDAT D 46 K
ELF	HYDRELF BIO 46
ESSO	HYDRAULIKOIL HE 46
FINA	BIOYIDRAN TMP 46 SE 46
FUCHS	PLANTOHYD S 46
KENDALL	SYNTH NATURA 46 HV
KUWAIT PETROLEUM K8	HOLBEIN 46
MOBIL	EAL SYNDRAULIC
MOBIL (USA)	ENVIROSYN 46 H
PAKELO	GEOLUBE HYDRAULIC EP-46
PANOLIN	HLP SYNTH 46
SHELL	NATURELLE HFE-46
TAMOIL	GREEN HYDRO SAFETY 46
TEXACO	HYDRA 46
TOTAL	EQUIVIS BIO 46
VAVOLINE	UNISYN HLP 32/68

⚠ WARNING

- **Do not mix HEES with organic hydraulic oils because the filters could clog (the maximum concentration of organic oil cannot exceed 1% of the total quantity of oil).**
- **Use HEES only in the hydraulic system; HEES cannot be used for engine oil, transmission oil, brake fluid, etc.**
- **Before using HEES in the hydraulic system, drain the system completely of the organic hydraulic oil. Disconnect the cylinders and hydraulic lines and drain the old hydraulic oil. Replace the hydraulic oil filter with a new one. Fill the hydraulic oil tank with HEES. Start the engine and let it idle, without using the work equipment. When the hydraulic oil temperature is 40° C (104° F), then start moving the work equipment. That way, all hydraulic parts are filled with the newly installed HEES. Stop the engine and check the oil level**

LUBRICATION DIAGRAMS

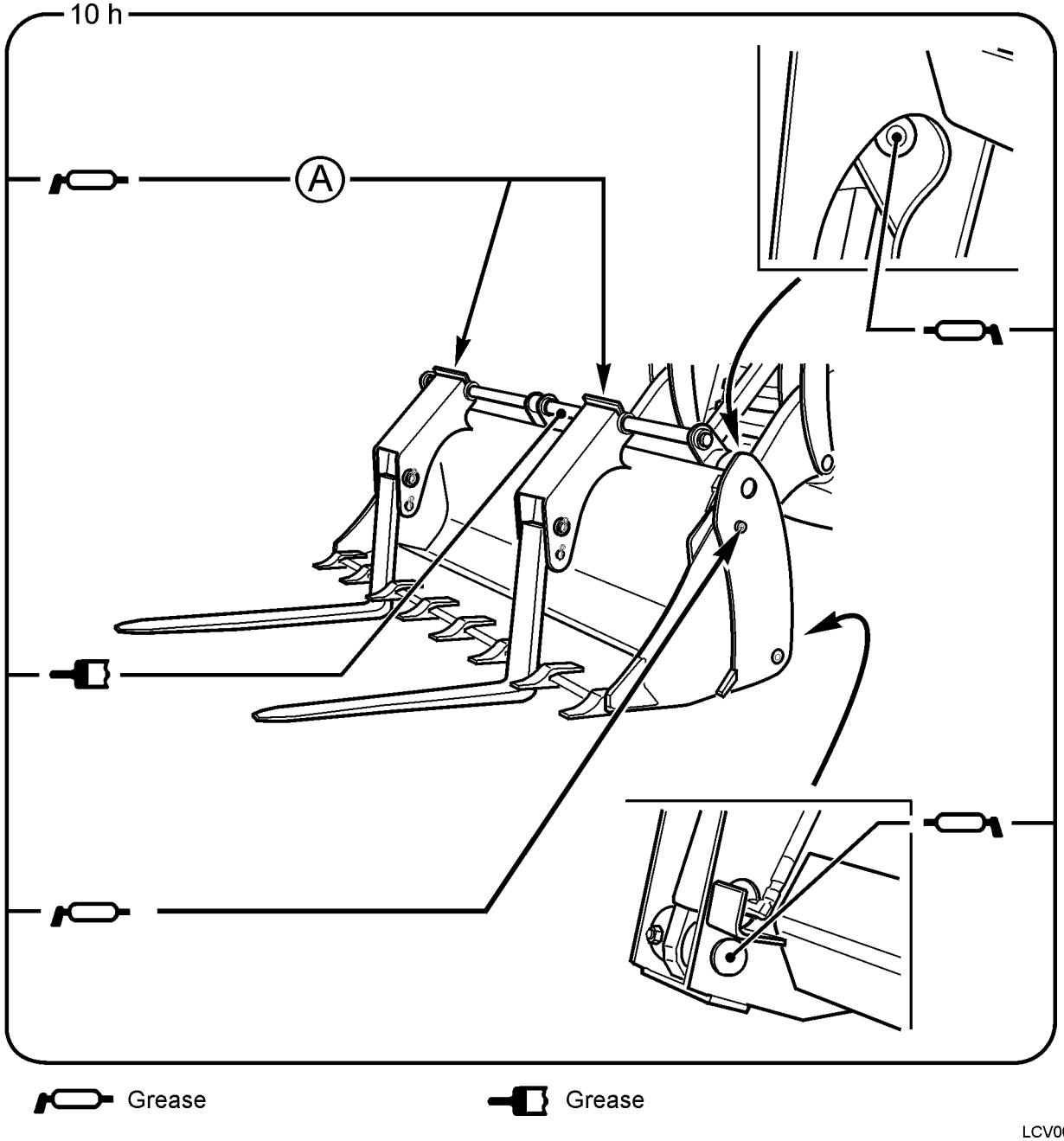
GENERAL



Note:Use only recommended oil and grease, See “FUEL, COOLANT, AND LUBRICANTS” on page 3-13.

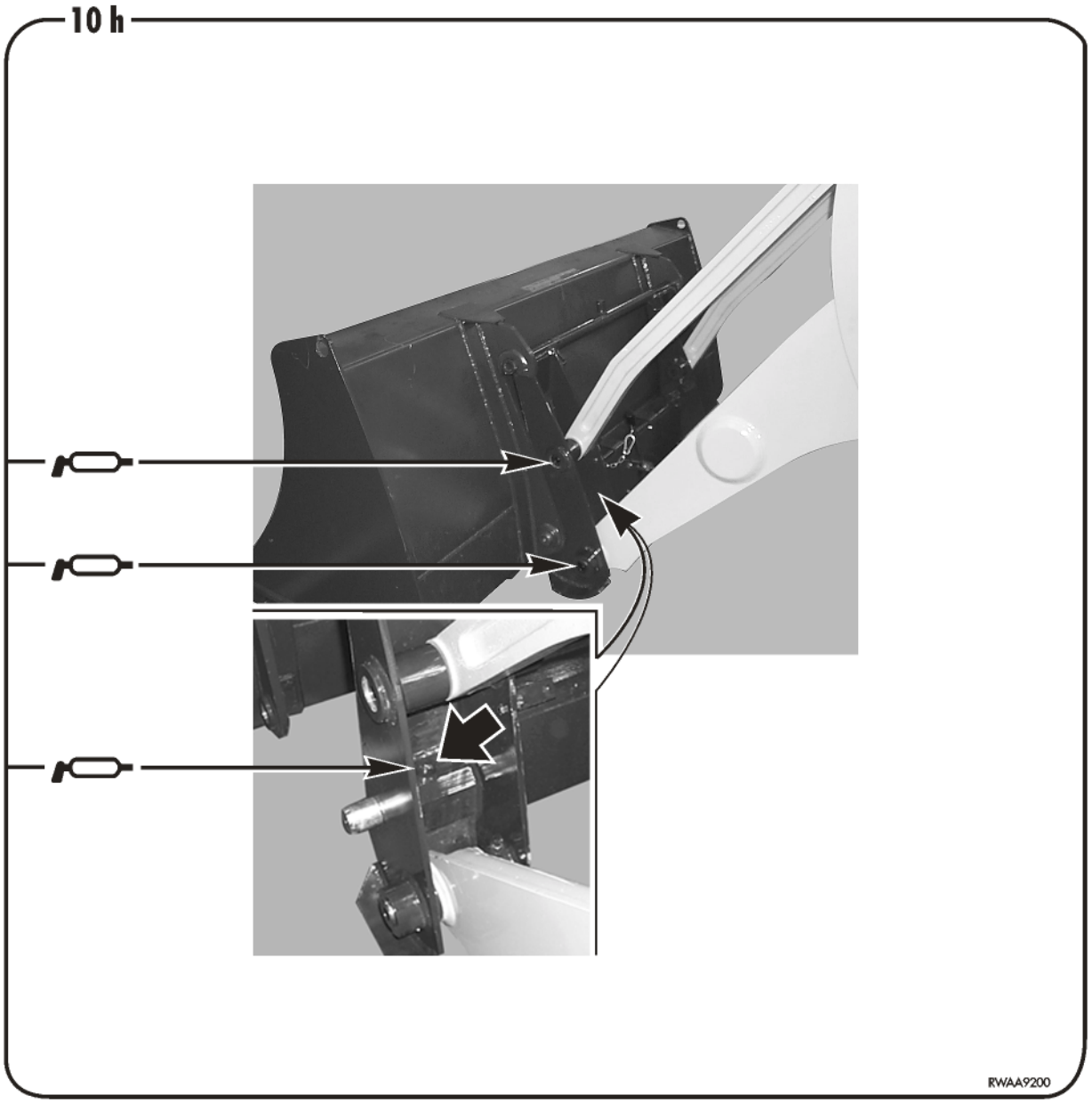
MULTIPURPOSE BUCKET AND PALLET FORKS

- Points indicated are symmetrical and must be lubricated every 10 hours.
- The fork sliding bars and safety pins must be lubricated with grease only to protect them from oxidation.
- Fork joints (A) must be lubricated only if the forks are used.



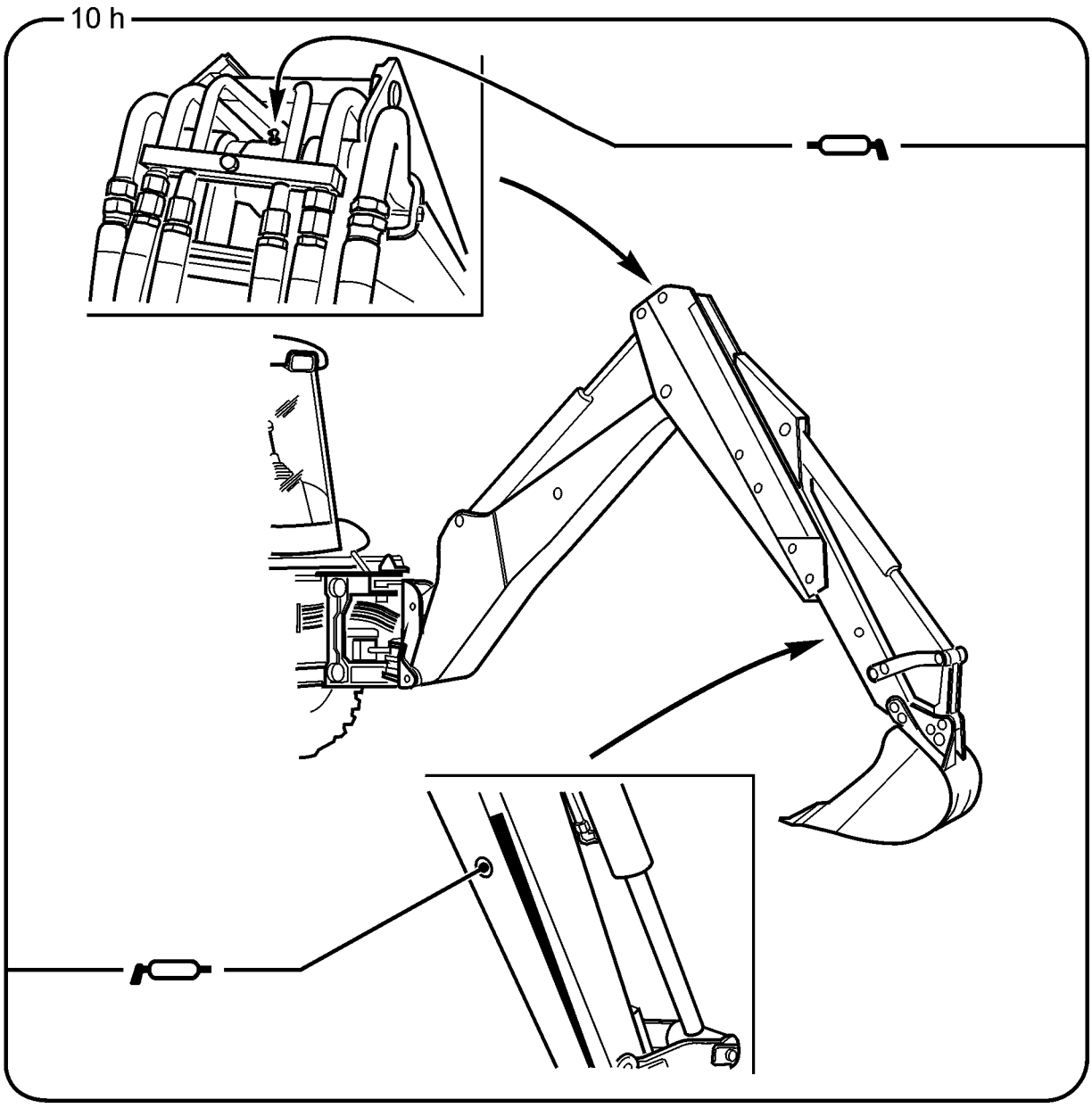
FRONT BUCKET QUICK COUPLINGS

- Points indicated are symmetrical and must be lubricated every 10 hours.



TELESCOPIC ARM

- Points indicated are symmetrical and must be lubricated every 10 hours.



SAFETY-RELATED PARTS MAINTENANCE

To ensure safety while using the machine, perform all scheduled maintenance operations. Furthermore, the operator must replace the components as scheduled in the table on the following pages. These components are subject to wear and because it is difficult to evaluate their internal conditions. Thus, after a the specified time, change the parts to prevent downtime at a future date. Replace these components immediately in case of failures or abnormalities, even if the time interval prescribed for their change (replacement) has not elapsed yet. If the hose clamps show signs of deterioration, like deformations or cracks, replace them at the same time as the hoses.

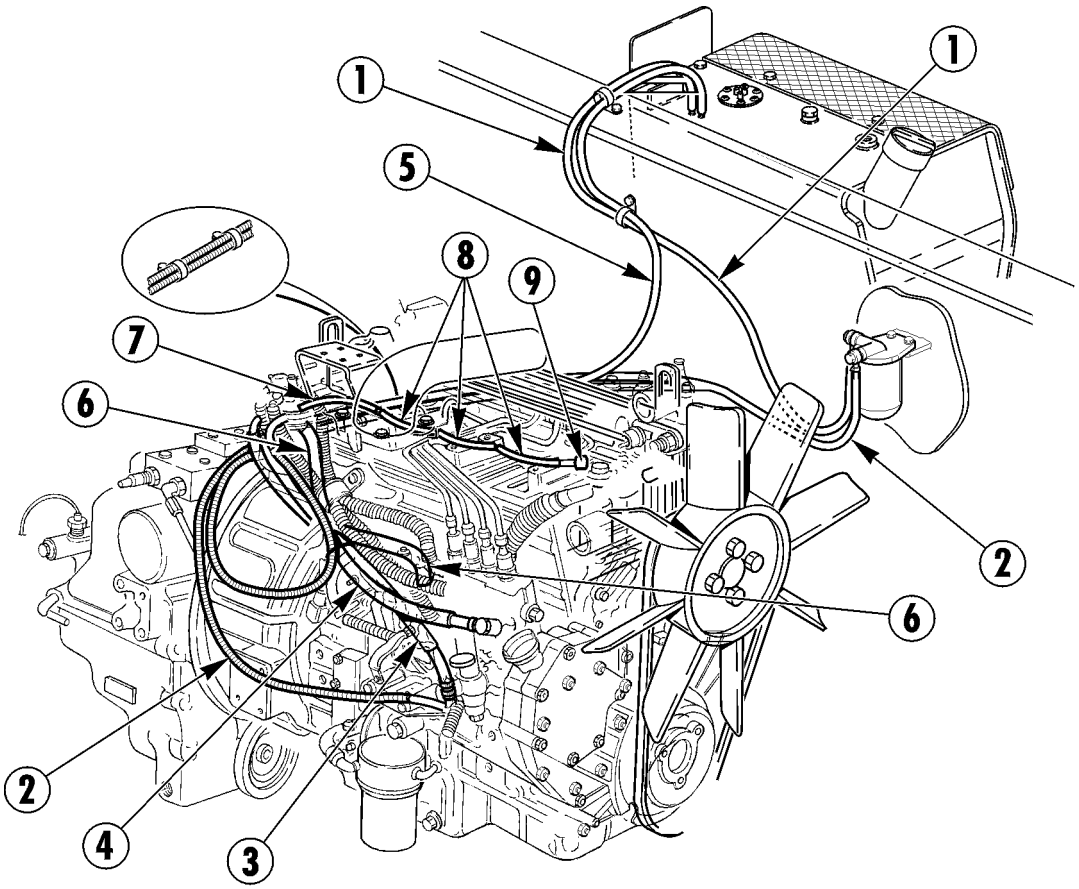
TYPE OF CHECK	CHECK ITEM
Daily checks before starting	Leakage from joints, grease fittings, hydraulic hoses, or fuel lines.
Monthly check	Leakage from joints, fittings, hydraulic hoses, or fuel lines. Damaged hydraulic or fuel lines (cracks, wear and tear).
Annual check	Leakage from joints, fittings, hydraulic hoses/fuel lines. Deteriorated, twisted, damaged hydraulic hoses/fuel lines (cracks, wear and tear) or in contact with other parts of the machine.

CRITICAL SAFETY PARTS

FUEL SUPPLY SYSTEM

No.	Components related to safety that require periodic replacing	Qty	Replacement interval
1	Fuel line (Fuel tank - precleaner)	1	Every 2 years or 4000 hours, whichever occurs first
2	Fuel line (Precleaner - fuel pump)	1	
3	Fuel line (Fuel pump - fuel filter)	1	
4	Fuel line (Fuel filter - injection pump)	1	
5	Fuel line (Fuel filter - fuel tank)	1	
6	Fuel recovery line (Injection pump - fuel filter)	1	
7	Fuel recovery line (Injector - fuel filter)	1	
8	Fuel recovery line (Between the injectors)	3	
9	Fuel recovery plug	1	

- For serial numbers and quantity of components that periodically need replacing, consult the replacement parts manual section regarding the components connected with safety and components that must be periodically replaced.
- When replacing hoses, always change O-rings, gaskets, and other related parts.

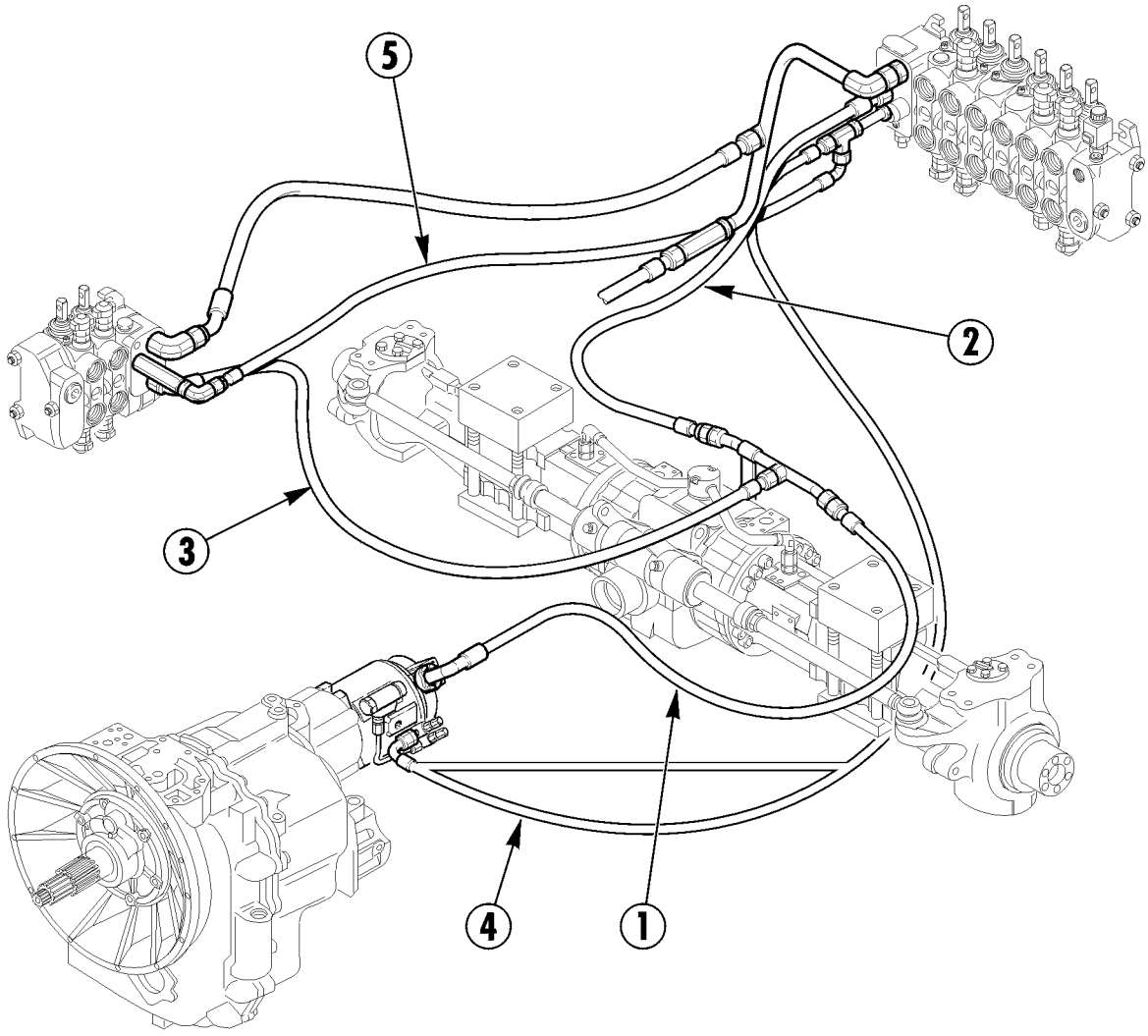


RWA31520

DELIVERY / RETURN HYDRAULIC SYSTEM

No.	Components related to safety that require periodic replacing	Qty	Replacement interval
1	Hydraulic hose (Hydraulic pump - iron tube)	1	Every 2 years or 4000 hours, whichever occurs first
2	Hydraulic hose (Iron tube - backhoe distributor)	1	
3	Hydraulic hose (Iron tube - loader distributor)	1	
4	Hydraulic hose (Hydraulic pump - backhoe distributor)	1	
5	Hydraulic hose (Loader distributor - backhoe distributor)	1	

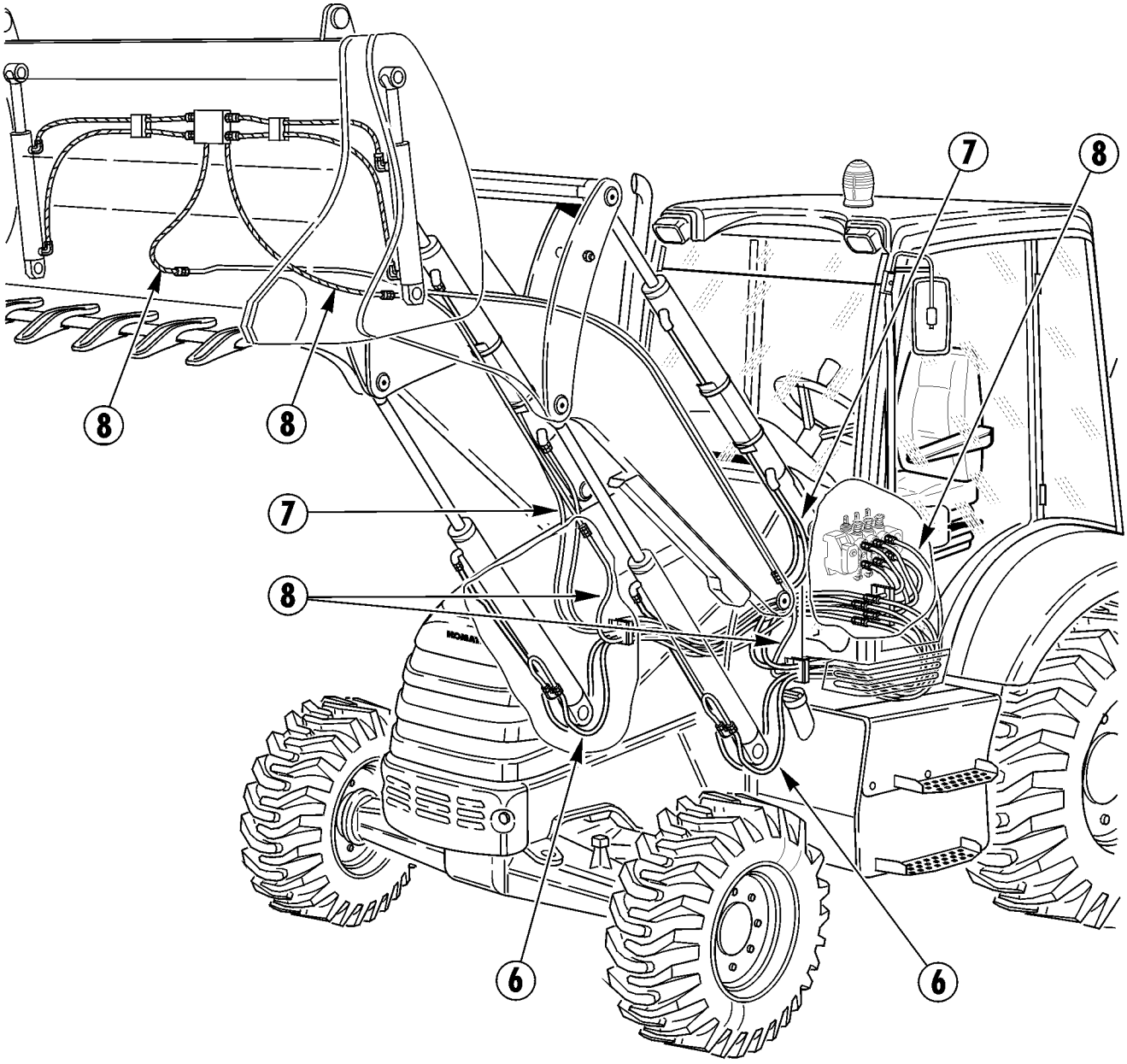
- For serial numbers and quantity of components that periodically need replacing, consult the replacement parts manual section regarding the components connected with safety and components that must be periodically replaced.
- When replacing hoses, always change O-rings, gaskets, and other related components.



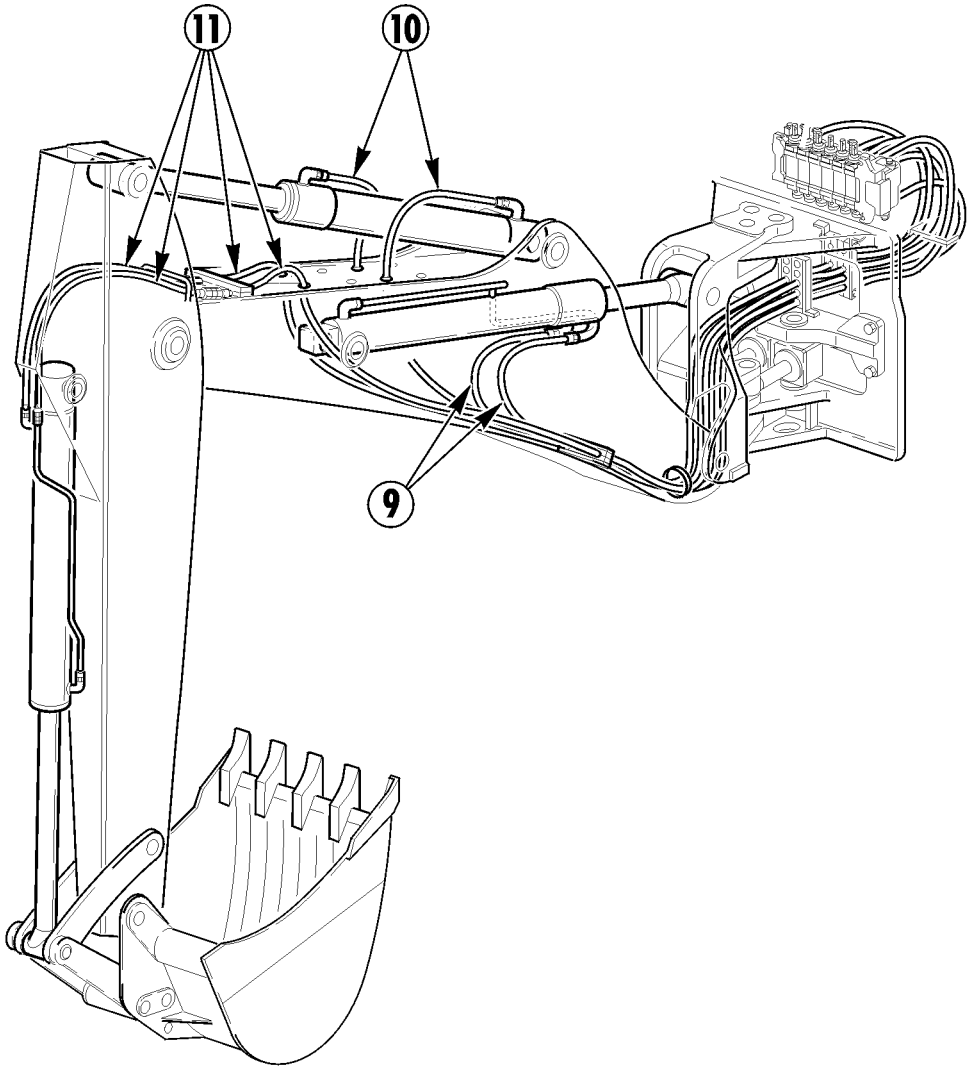
RWA31530

LOADER AND BACKHOE HYDRAULIC SYSTEM

No.	Components related to safety that require periodic replacing	Qty	Replacement interval
6	Hydraulic hose (Cylinders - Loader arm)	1	Every 2 years or 4000 hours, whichever occurs first
7	Hydraulic hose (Cylinders - Loader bucket)	1	
8	Hydraulic hose (Cylinders - Multi-purpose bucket)	1	
9	Hydraulic hose (Cylinders - Backhoe boom)	1	
10	Hydraulic hose (Cylinders - Backhoe arm)	1	
11	Hydraulic hose (Cylinders - Backhoe bucket)		



RWA31540

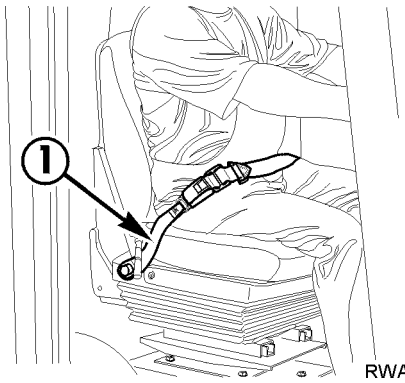


RWA31550

- For serial numbers and quantity of components that periodically need replacing, consult the replacement parts manual section regarding the components connected with safety and components that must be periodically replaced.
- When replacing hoses, always change O-rings, gaskets, and other related components.

OPERATOR'S SAFETY

No.	Safety-related components that periodically need replacement	Qty	Replacement interval
1	Safety belt	1	Every 4 years



RWA31240

TORQUE VALUES

GENERAL TORQUE VALUES — BOLTS AND NUTS

Thread diameter (mm)	Pitch (mm)	Wrench size (mm)	8.8			10.9		
			kgm	Nm	lb ft	kgm	Nm	lb ft
6	1	10	0.96 ± 0.1	9.5 ± 1	7 ± 0.74	1.3 ± 0.15	13.5 ± 1.5	10 ± 1
8	1.25	13	2.3 ± 0.2	23 ± 2	17 ± 1.5	3.2 ± 0.3	32.2 ± 3.5	24 ± 2.6
10	1.5	17	4.6 ± 0.5	45 ± 4.9	32 ± 3.6	6.5 ± 0.6	63 ± 6.5	47 ± 4.8
12	1.75	19	7.8 ± 0.8	77 ± 8	57 ± 5.9	11 ± 1	108 ± 11	80 ± 8
14	2	22	12.5 ± 1	122 ± 13	90 ± 9.6	17.5 ±2	172 ± 18	127 ± 13
16	2	24	19.5 ± 2	191 ± 21	141 ± 15	27 ± 3	268 ± 29	198 ± 22
18	2.5	27	27 ± 3	262 ± 28	194 ± 21	37 ± 4	366 ± 36	270 ± 26
20	2.5	30	38 ± 4	372 ± 40	275 ± 30	53 ± 6	524 ± 57	387 ± 42
22	2.5	32	52 ± 6	511 ± 57	377 ± 42	73 ± 8	719 ± 80	531 ± 59
24	3	36	66 ± 7	644 ± 70	475 ± 52	92 ± 10	905 ± 98	668 ± 72
27	3	41	96 ± 10	945 ± 100	698 ± 74	135 ± 15	1329 ± 140	980 ± 103
30	3.5	46	131 ± 14	1287 ± 140	950 ± 103	184 ± 20	1810 ± 190	1336 ± 140

SPECIFIC TORQUE VALUES

⚠ WARNING

This torque table is not valid for screws, nuts with nylon inserts, or spring washers.

Item	Description	kgm	Nm	lb ft
Cab	Front support screws Rear support screws	20 ± 1 20 ± 1	196 ± 9.8 196 ± 9.8	145 ± 7.4 145 ± 7.4
Wheels	Front Rear	35.7 ± 1 51 ± 1	350 ± 9.8 500 ± 9.8	258 ± 7.4 369 ± 7.4
Front bucket	Teeth	14.5 ± 1	143 ± 9.8	106 ± 7.4
Backhoe bucket	Central teeth Side teeth	14.5 ± 1 14.5 ± 1	143 ± 9.8 143 ± 9.8	106 ± 7.4 106 ± 7.4
Engine and transmission	Front support central screw Rear support central screw	20 ± 1 20 ± 1	196 ± 9.8 196 ± 9.8	145 ± 7.4 145 ± 7.4

MAINTENANCE PLAN

CHECKS BEFORE STARTING

Item	Description	Operation	Page
a	Various checks	Check	3-32
b	Fuel level	Check, (add fluid)	3-32
c	Coolant level	Check	3-33
d	Engine oil level	Check	3-33
e	Hydraulic oil level	Check	3-34
f	Water separator	Drain water	3-35

MAINTENANCE EVERY 10 HOURS OF OPERATION

Item	Description	Operation	Page
a	Joints - Loader	Lubricate	3-36
b	Joints - Backhoe	Lubricate	3-37

MAINTENANCE AFTER THE FIRST 50 HOURS OF OPERATION

- Only for machines that use HEES.
- Perform these operations together with those to be initiated every “50 HOURS”.

Item	Description	Operation	Page
a	Hydraulic oil filter Only for machines using HEES	Change	3-38

MAINTENANCE EVERY 50 HOURS OF OPERATION

Item	Description	Operation	Page
a	Radiator	Check coolant level, (add coolant)	3-38
b	Brake system	Check oil level	3-38
c	Propeller shafts	Lubricate (6 points)	3-39
d	King pin and central coupling	Lubricate (5 points)	3-40
e	Front and rear wheels	Check tire pressure	3-40
f	Electrical system	Check	3-41

MAINTENANCE AFTER FIRST 250 HOURS OF OPERATION

Perform in conjunction with those items listed in every 250 hours of operation.

Item	Description	Operation	Page
a	Front axle	Change oil	3-41
b	Rear axle	Change oil	3-41
c	Transmission oil	Change oil	3-41
d	Transmission filter	Change	3-41
e	Engine valves	Check clearance, (adjust)	3-41
f	Hydraulic oil filter	Change	3-41

MAINTENANCE EVERY 250 HOURS OF OPERATION

Item	Description	Operation	Page
a	Fan belt	Check conditions and tension, (adjust)	3-42
b	Radiators	Clean outside	3-43
c	Battery	Check electrolyte level, (add fluid)	3-43
d	Front axle	Check levels, (add oil)	3-44
e	Rear axle	Check levels, (add oil)	3-44
f	Transmission oil	Check level, (add oil)	3-45
g	Front and rear wheels	Check lug nut tightening	3-45

MAINTENANCE AFTER THE FIRST 500 HOURS OF OPERATION

- Only for machines that use HEES — synthetic, biodegradeable oil.
- Perform these operations together with those to be initiated every “500 HOURS”.

Item	Description	Operation	Page
a	Hydraulic oil and suction filter Only for machines using HEES	Change oil and clean filter	3-46

MAINTENANCE EVERY 500 HOURS OF OPERATION

Item	Description	Operation	Page
a	Engine oil	Change	3-46
b	Engine oil filter	Change	3-47
c	Hydraulic oil drain filter	Change	3-48
d	Fuel filter	Change	3-50
e	Fuel tank	Drain condensation	3-51
f	Hydraulic oil tank Only machines that use HEES	Drain condensation	3-52

MAINTENANCE EVERY 1,000 HOURS OF OPERATION

Item	Description	Operation	Page
a	Front axle	Change oil	3-53
b	Rear axle	Change oil	3-54
c	Transmission oil	Change oil	3-55
d	Transmission filter	Change	3-56
e	Engine valves	Check clearance, (adjust)	3-57

MAINTENANCE EVERY 2,000 HOURS OF OPERATION

Item	Description	Operation	Page
a	Hydraulic oil and suction filter	Change oil and clean filter	3-57
b	Coolant	Change	3-59
c	Brake fluid	Change	3-61
d	Alternator and starter	Check	3-61

WHEN REQUIRED

Item	Description	Operation	Page
a	Engine air cleaner	Check, clean or change	3-62
b	Cab air filters	Check and clean	3-63
c	Brake system	Bleed air	3-64
d	Cooling system	Flush	3-65
e	Water separator	Clean	3-68
f	Front wheels	Adjust toe-in	3-68
g	Parking brake	Check and adjust	3-69
h	Service brake	Check braking	3-70
j	Brake pedals	Adjust stroke	3-70
k	Return to dig	Adjust	3-71

MAINTENANCE INTERVALS WHEN DEMOLITION HAMMER IS USED

Item	Description	Operation	Page
a	Hydraulic oil filter	Change cartridge	3-72
b	Hydraulic oil	Change	3-72

CHECKS BEFORE STARTING

VARIOUS CHECKS

⚠ WARNING

Fuel leaks in the engine compartment near hot areas may cause fires. If a fuel leak occurs, perform the necessary repairs immediately. If this situation occurs repeatedly, contact your Komatsu dealer.

Before starting the engine, check the following:

1. Check for loose screws or nuts.
2. Check for oil, fuel, or coolant leakage.
3. Check for worn equipment.
4. Check condition of wheel rims, and condition and wear of the tires.
5. Check condition and efficiency of instruments and warning lights on the dashboard, working lights and direction indicators.

The other general checks concern safety and functionality:

6. Soundness of safety belt.
7. Warning plates and decals clean and legible.
8. Cleanliness of the ladder steps and hand rails used to reach the driver's seat.
9. Cleanliness inside the operator's compartment.

CHECK THE FUEL LEVEL

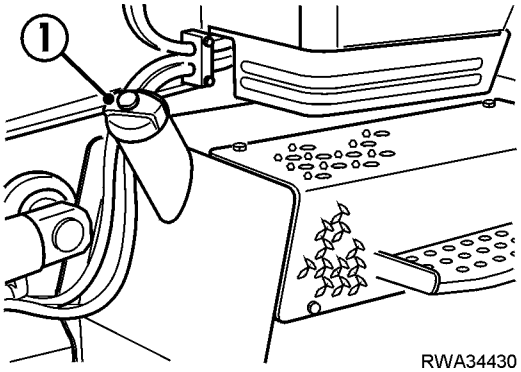
⚠ WARNING

When refueling, avoid spilling fuel to prevent any risk of fire. If any fuel spills, clean it up immediately.
Fuel is flammable. Do not smoke while refueling.

To check the fuel level, use the indicator provided on the dashboard. Do not fill the tank completely; leave space for the fuel to expand in hot weather.

Remark

Refuel after work to prevent condensation inside the fuel tank. After refueling, tighten the filler cap (1) thoroughly and lock the tank.

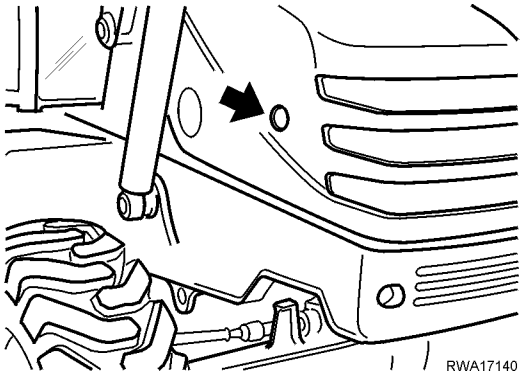


CHECK THE COOLANT LEVEL

WARNING

Do not remove the radiator cap. Check coolant level at the expansion tank with the engine cold.

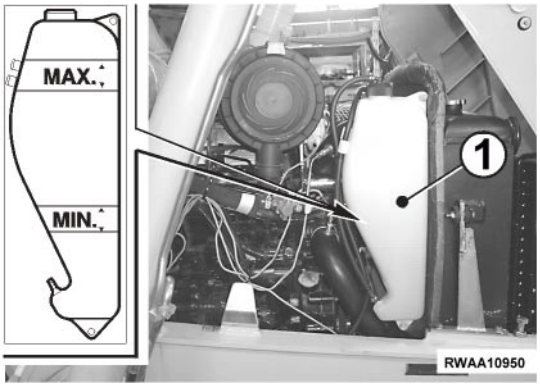
The coolant level can be checked at the expansion tank (1). The expansion tank (1) can be reached after opening the engine hood.



With the engine cold, coolant must be between the MIN and MAX marks. If the coolant level is near or lower than the MIN mark, fill the tank with coolant. A small but constant decrease or sudden, large decrease indicates a leak. Check the radiator, engine, heater core, and hoses for leaks.

WARNING

The upper MIN. and MAX. marks indicate the expansion level of the coolant at operating temperature.

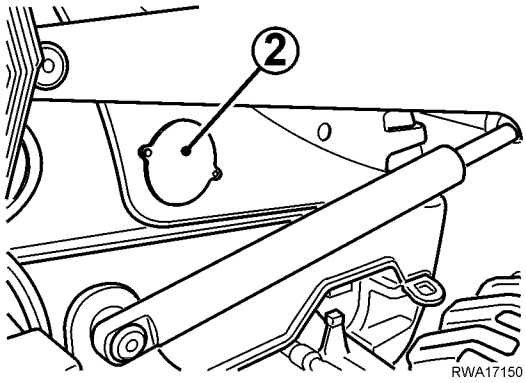


CHECK THE ENGINE OIL LEVEL

WARNING

After the machine is stopped, the engine is very hot. Let the engine cool down before performing any check. Hot engines may cause burns.

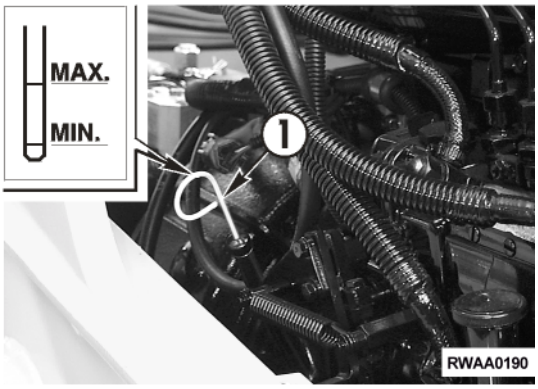
The dipstick (**1**) can be reached through an opening in the right side of engine hood after opening the inspection cover (2). Perform the check with a cold engine and the machine on level ground.



Check the oil level using the dipstick (1). The oil must be between the MIN. and MAX. marks. If the level is near the MIN. mark, add the proper viscosity oil according to the ambient temperature.

WARNING

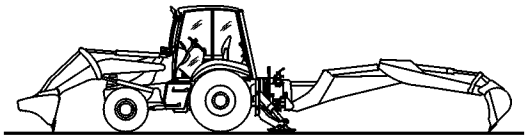
When checking the oil level, stop the engine and wait 15 minutes before checking.



CHECK THE HYDRAULIC OIL LEVEL

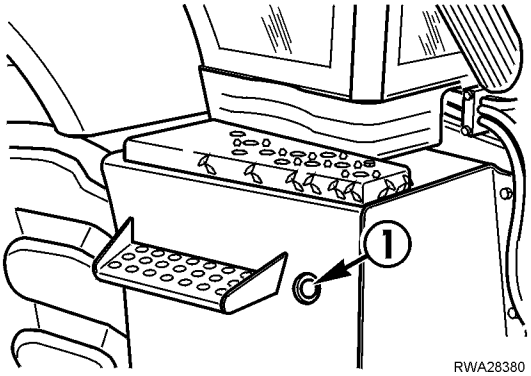
⚠ WARNING

Check the oil level in the hydraulic system when the oil is cold, the machine on level ground and in the lubricating position.
If it is necessary to add hydraulic oil, stop the engine. Move the controls more than once to eliminate the residual pressure in the hydraulic lines before removing the filler cap.



RWA16610

The oil level must be visible through the gauge (1) positioned on the tank and must be filled between MIN and MAX marks.

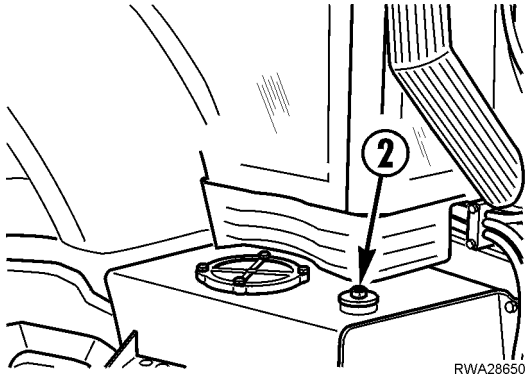


RWA28380

If the oil level is below or at the MIN mark, remove the filler cap (2) and add the prescribed hydraulic oil through the filler opening (2). Reinstall the filler cap (2). Use a 24 mm hexagon wrench.

⚠ WARNING

When adding oil, do not add oil beyond the MAX level or damage to the hydraulic system could result. If the hydraulic oil level is constantly low or a single large oil loss, check the hydraulic lines, the pistons, and the pump for leaks.

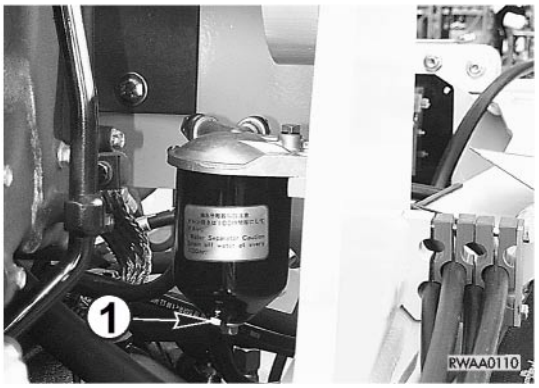


RWA28650

DRAIN THE WATER SEPARATOR

WARNING

The fuel is flammable. Do not smoke while draining the water separator, and do not have flames near it. Clean up any spilled fuel immediately.



The water separator can be reached after opening the engine hood. Before draining the condensation from the separator, make sure the fuel tank is full to prevent air from entering the fuel system.

Using a 13 mm wrench, loosen the plug (1) and wait until only clear diesel fuel flows from the separator. Tighten the plug using the wrench. Drain the condensation at the end of each shift before the engine has completely cooled down. This step prevents the condensation from freezing in cold weather.

MAINTENANCE EVERY 10 HOURS OF OPERATION

LUBRICATING JOINTS (GREASE FITTINGS)

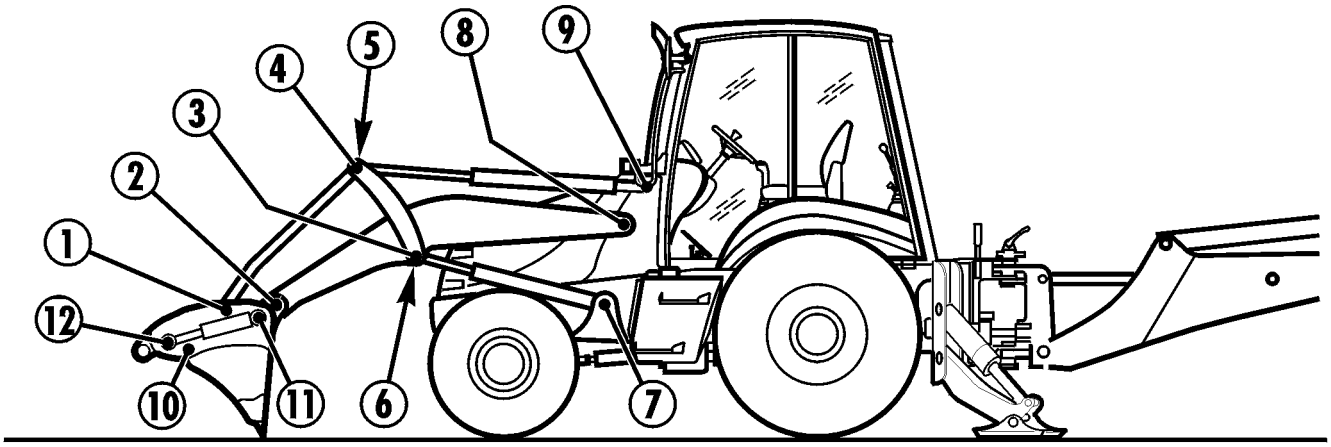
WARNING

Clean the grease fittings before attaching the grease pump. After lubrication, remove all grease that may have spread out of the fittings. If the machine is used in water, lubricate more frequently than specified.

Perform this maintenance operation with the front bucket resting on the ground, and backhoe equipment completely extended and resting on the ground.Use the prescribed grease.
As a general rule, each cylinder is provided with two grease fittings on the couplings. And each pin serves as a fulcrum point for movement.

JOINT LUBRICATION POINTS

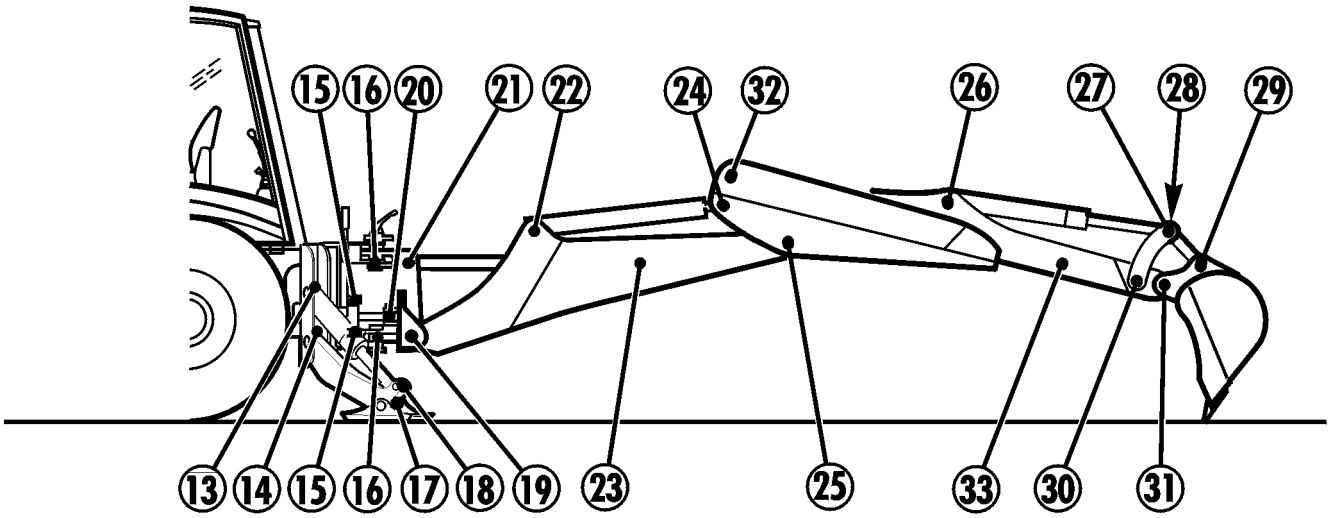
LUBRICATION LOCATIONS — LOADER



RWA04450

1	Tie rod - bucket coupling pin	(2 POINTS)
2	Bucket fulcrum pin	(2 POINTS)
3	Lever fulcrum pin	(2 POINTS)
4	Tie rod - lever coupling pin	(2 POINTS)
5	Bucket cylinder head pin	(2 POINTS)
6	Lift cylinder head pin	(2 POINTS)
7	Lift cylinder base pin	(2 POINTS)
8	Arm fulcrum pin	(2 POINTS)
9	Bucket cylinder base pin	(2 POINTS)
10	Multipurpose bucket fulcrum pin (option)	(2 POINTS)
11	Multipurpose bucket cylinder base pin (option)	(2 POINTS)
12	Multipurpose bucket cylinder head pin (option)	(2 POINTS)

LUBRICATION LOCATIONS — BACKHOE



13	Stabilizer cylinder pin	(2 POINTS)
14	Stabilizer arm fulcrum pin	(2 POINTS)
15	Boom swing cylinder base pin	(4 POINTS)
16	Boom swing fulcrum pin	(2 POINTS)
17	Stabilizer foot fulcrum pin	(2 POINTS)
18	Stabilizer ram pin	(2 POINTS)
19	Boom fulcrum pin	(2 POINTS)
20	Boom swing cylinder head pin	(2 POINTS)
21	Lift cylinder head pin	(1 POINTS)
22	Arm cylinder base pin	(1 POINTS)
23	Lift cylinder base pin	(1 POINTS)
24	Arm cylinder head pin	(1 POINTS)
25	Arm fulcrum pin	(1 POINTS)
26	Bucket cylinder base pin	(1 POINTS)
27	Bucket cylinder head pin	(1 POINTS)
28	Tie rod - lever coupling pin	(2 POINTS)
29	Tie rod - bucket coupling pin	(2 POINTS)
30	Lever fulcrum pin	(1 POINTS)
31	Bucket fulcrum pin	(1 POINTS)
32	Telescopic arm cylinder base pin (optional)	(1 POINTS)
33	Telescopic arm cylinder head pin (optional)	(1 POINTS)

MAINTENANCE AFTER FIRST 50 HOURS OF OPERATION

(ONLY FOR MACHINES THAT USE HEES — SYNTHETIC, BIODEGRADABLE HYDRAULIC OIL)
The following maintenance operation must be performed after the first 50 hours of operation, together with maintenance operations to be initiated "EVERY 50 HOURS".

- HYDRAULIC OIL FILTER CHANGE

MAINTENANCE EVERY 50 HOURS OF OPERATION

CHECK THE RADIATOR COOLANT LEVEL

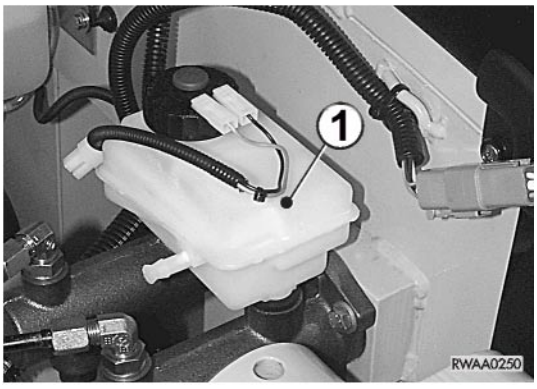
WARNING

Perform this check with the machine parked on level ground and loader arm raised with the safety lock engaged. Do not remove the radiator cap when the coolant is hot, because the fluid may be sprayed out of the radiator and cause burns. Loosen the radiator cap slowly to release the pressure before removing it.

The radiator cap can be reached after opening the engine hood.
Remove the cap (1) and make sure that the fluid is very near the filling hole.

★ If the coolant level in the radiator is low and the expansion tank is filled with coolant, check cap tightness and make sure that there are no air leaks from the coupling that connects the radiator and expansion tank. If problem persists, contact your Komatsu dealer.

CHECK THE BRAKE FLUID LEVEL

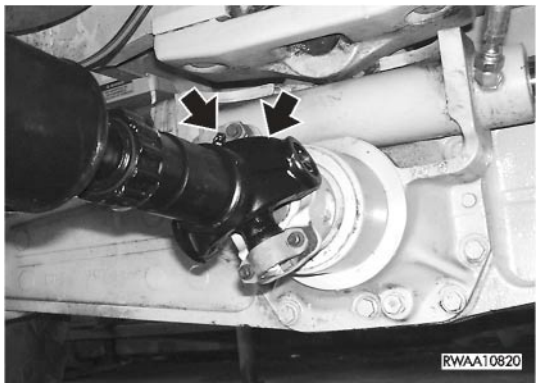


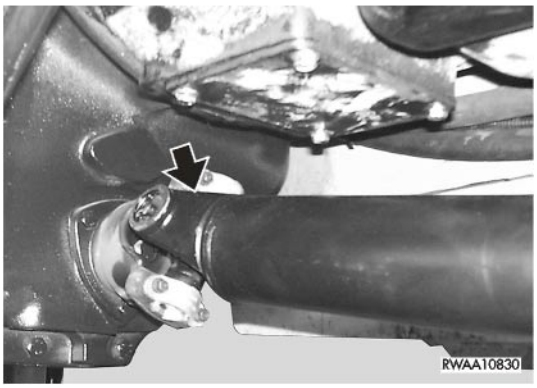
Open the engine hood to access the brake reservoir (1). If needed, add fluid to the reservoir until the fluid is at MAX mark. Use new fluid only.

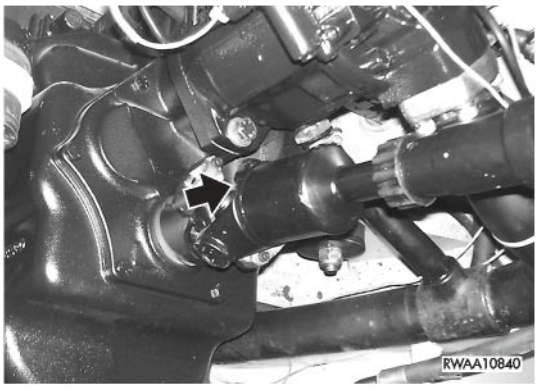
★ If the brake fluid is constantly low, contact your Komatsu dealer to have the system checked and necessary repairs made.

LUBRICATE THE PROPELLER SHAFTS

Clean the grease fittings before attaching the grease pump to them. After ensuring that all points are lubricated, remove the contaminated grease that may have spread out of the joints.

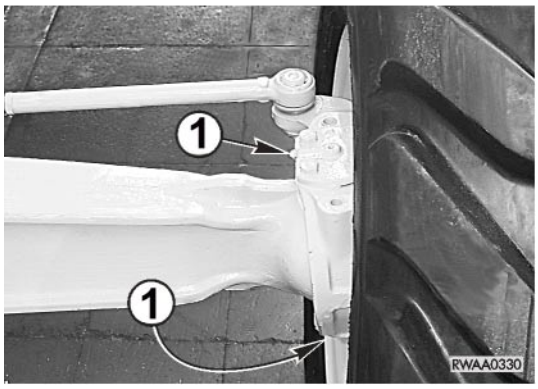


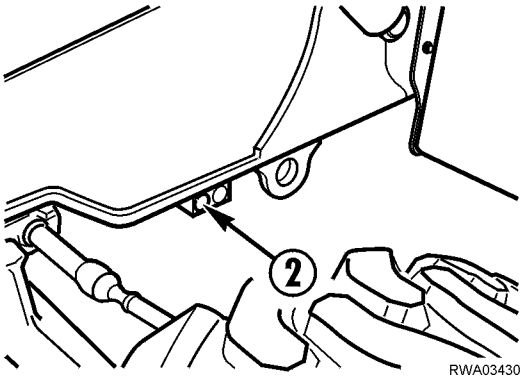




LUBRICATE THE KING PIN

King pin lubrication points (1) are indicated in the photo. The central joint grease fitting is (2) on the frame.
Clean the grease fittings and then attach the grease pump with the prescribed grease. After lubricating, remove the contaminated grease that may have spread out of the joints and central coupling.



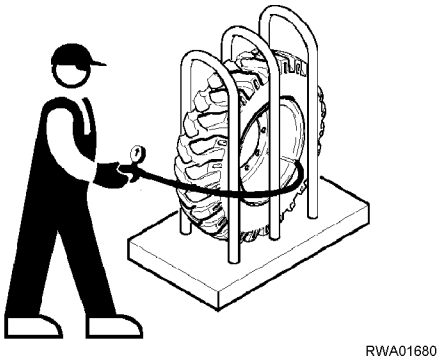


CHECK THE TIRE PRESSURE

⚠ WARNING

Inflate the tire only after positioning it in a cage. To inflate the tire, stand to the side of the tire. Do not exceed the tire pressure listed in “SPECIFICATIONS" section 4.

This check promotes long tire life and prevents blowouts.
The correct pressures are indicated in the specifications section 4. After checking the tire pressure, check the condition of the tread and sidewalls.



CHECK THE ELECTRICAL SYSTEM

⚠ WARNING

Replace corroded or oxidized fuses with fuses having the same amperage rating. Before changing a fuse, make sure that the ignition key is in the OFF position. If there are signs of short circuits on the cables, contact your Komatsu Dealer for troubleshooting.

Make sure that there are no disconnected cables or signs of short circuit in the electrical system.
Make sure that all the cables are securely tightened to their respective terminals. Tighten any loose cables.
Check the following:
1. Battery
2. Starter
3. Alternator

MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION

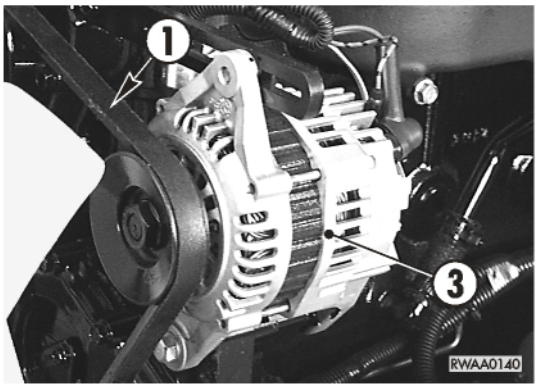
Perform the following maintenance after the first 250 hours, together with those to be initiated "EVERY 250 HOURS".
- FRONT AXLE OIL CHANGE
- REAR AXLE OIL CHANGE
- HYDRAULIC TRANSMISSION OIL CHANGE
- HYDRAULIC TRANSMISSION OIL FILTER CHANGE
- ENGINE VALVE CLEARANCE CHECK AND ADJUSTMENT
- HYDRAULIC OIL FILTER CHANGE

For checks and adjustments, contact your Komatsu dealer.

MAINTENANCE EVERY 250 HOURS OF OPERATION

Perform the following operations together with those to be initiated every 50 HOURS:

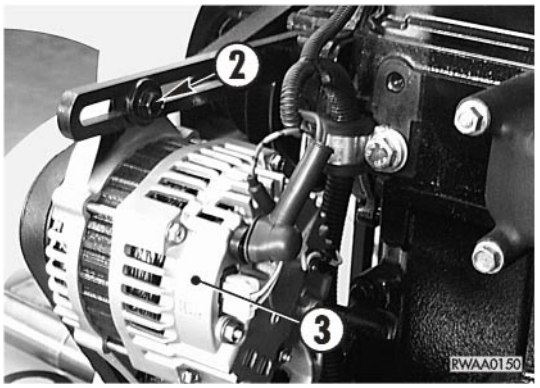
ADJUST THE FAN BELT TENSION



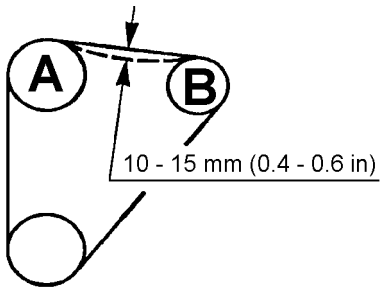
The fan belt can be reached after opening the engine hood. At a point midway between the two pulleys, press the belt (1) with your thumb with a force equal to about 98 N (22 lb.). The belt deflection should be from 10 to 15 mm (0.4 to 0.6 in.). If the deflection exceeds this value, loosen the bolt (2) that fastens the alternator (3). With a lever inserted between the engine block and casing, slide the alternator away from the engine. Tighten the bolt (2) and check again. Check the belt tension again after a few hours of operation.

- Use a 12 mm wrench.

★ If deflection exceeds the specified distance and the belt cannot be adjusted to obtain the desired deflection, the belt is worn and must be replaced.



A = Fan pulley
B = Alternator pulley



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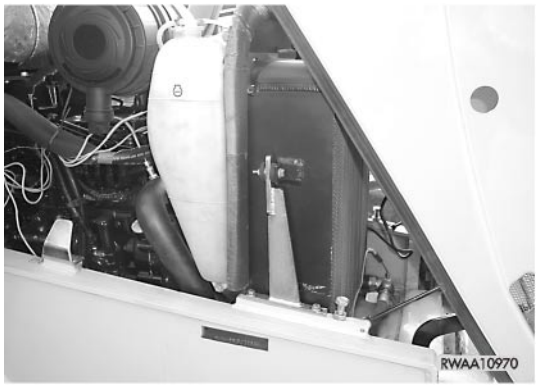
CLEAN THE OUTSIDE OF RADIATOR



WARNING

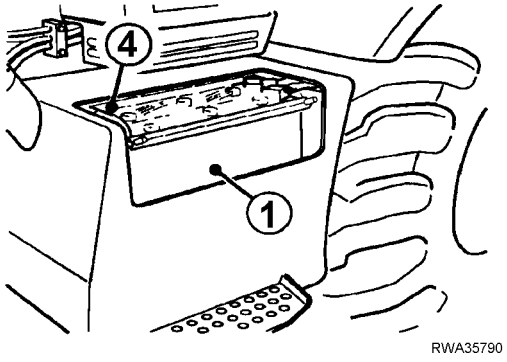
Do not direct compressed air, steam, or water at a person or injuries may result. Always wear safety goggles.

Clean the outside of the radiator with compressed air, low-pressure water, or steam. Cleaning products are available on the market and can be used. Follow the instructions on the package. Wash the parts and then thoroughly dry them.

★ Do not use cleaning products that contain even a small quantity of oily substances because they attract dirt. Dirt on the radiator interfere with the heat exchange process, which could cause an overheating condition.

★ Clean the outside of the radiator whenever the radiator is dirty with oil, diesel oil, greasy or oily substances.

CHECK BATTERY ELECTROLYTE LEVEL



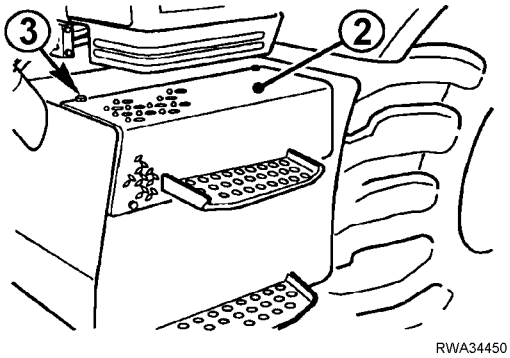
WARNING

Check the battery level with the machine on flat ground and after stopping the engine. If the battery level is low, add distilled water. Always wear safety goggles and waterproof gloves when servicing the battery. To prevent gas explosions, do not have flames near the battery or do not smoke while servicing the battery. Avoid producing sparks from short circuits that would cause the battery to explode. If electrolyte gets in your eyes, pour plenty of water in your eyes and consult a doctor immediately. If electrolyte gets on your skin, immediately wash the skin with soap and water.

The battery (1) can be reached after removing the cover (2) fastening screws (3). Use a 17 mm hexagon wrench.

The electrolyte level in each cell must be about 6 mm (0.24 in.) above the plate edge; if necessary, add distilled water only.

To reach the filling holes of the cells, first remove guard (4). After finishing, reinstall the guard (4) and cover (2) with fastening screws (3).

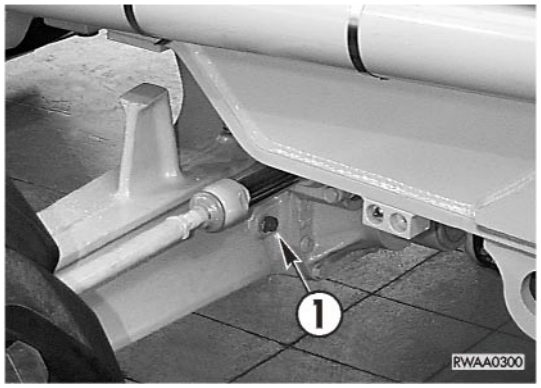


★ Add distilled water before starting work so the water can mix with the electrolyte and prevent the water from freezing.

★ Before reinstalling the cell plugs, make sure that the breather holes are not clogged.

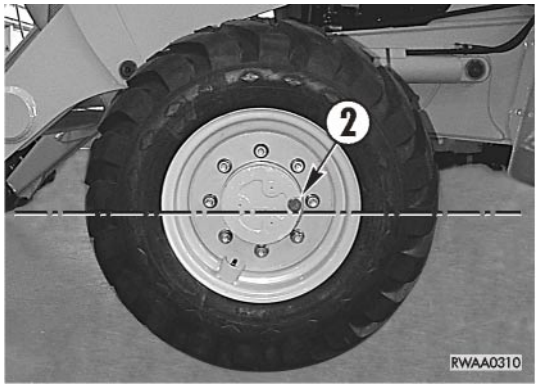
★ Make sure that the connection terminals are not oxidized. If necessary, clean them and cover them with antioxidation grease.

CHECK THE FRONT AXLE OIL LEVEL

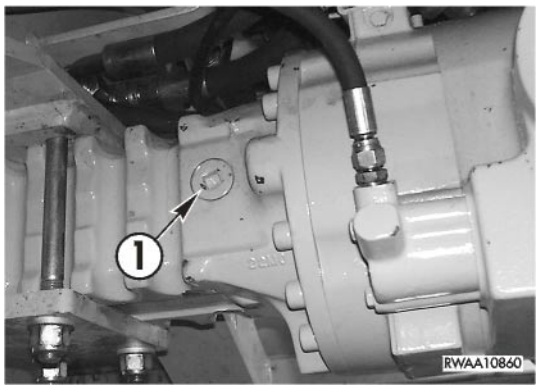


DIFFERENTIAL
This check determines if the lubricant reaches the bottom of hole (1). If not, add the prescribed oil. The oil level hole (**1**) also serves as the filler hole. Use a 17 mm wrench.

PLANETARY
Conduct this check with each reduction gear, with the plug on the horizontal axis (3 or 9 o'clock position). If necessary, move the machine slightly until plug is at the 3 or 9 o'clock position. The oil should be at the bottom edge of the hole (2). If not, add the prescribed oil. Use a 17 mm wrench.

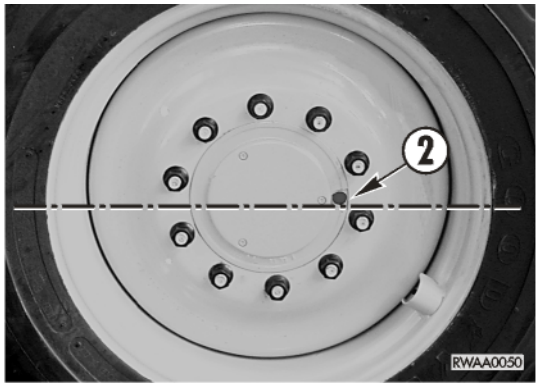


CHECK THE REAR AXLE OIL LEVELS



DIFFERENTIAL
This check determines if the lubricant reaches the bottom of the hole (1). If not, add the prescribed oil. The oil level hole (1) also serves as the filling hole. Use a 1/2 in. square wrench.

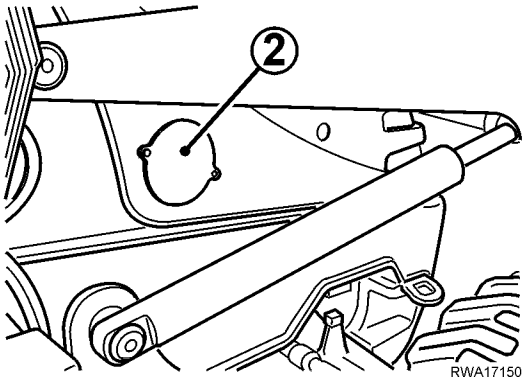
PLANETARY
Perform the check on each reduction gear, with the plug (2) on the horizontal axis (3 or 9 o'clock position). If necessary, move the machine slightly until the plug is at the 3 or 9 o'clock. The oil should be at the bottom edge of the hole (2). If not, add the prescribed oil. Use a 1/2 in. square wrench.



CHECK THE TRANSMISSION OIL LEVEL

WARNING

Check the transmission oil level at operating temperature with the engine running. Be very careful to avoid getting burned. If it is necessary to add oil, stop the engine before opening the engine hood. To prevent possible injury from unexpected machine movement, always engage the parking brake.



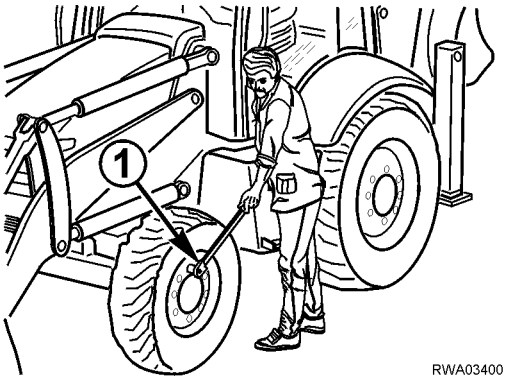
The dipstick (1) can be reached through the opening on the right side of the engine hood, which is protected by inspection cover (2). The level must be checked with the engine running from 800 to 1,000 RPM and with the transmission oil at operating temperature. The oil level should be at or near the MAX mark. If not, pour the prescribed oil into the dipstick (1) filler tube. After checking the transmission oil level, close the inspection cover (2) and lock it.

CHECK THE WHEEL LUG NUT TORQUE

This check verifies that the wheel lug nuts are correctly torqued.
Check the lug nut torque with a torque wrench (1). Use a 27 mm wrench for the front wheels and a 32 mm wrench for the rear wheels.

★ Do not increase the specified torque.

★ When checking the torque, do not lubricate the fastener threads.



MAINTENANCE AFTER FIRST 500 HOURS OF OPERATION

★ **Only for machines that use HEES — synthetic, biodegradable oil**

The following maintenance operation must be performed after the first 500 hours of operation, together with maintenance operations to be initiated "EVERY 500 HOURS".

- HYDRAULIC OIL CHANGE AND SUCTION FILTER CLEANING

MAINTENANCE EVERY 500 HOURS OF OPERATION

Perform these operations together with those initiated every 50 HOURS and 250 HOURS.

CHANGE THE ENGINE OIL

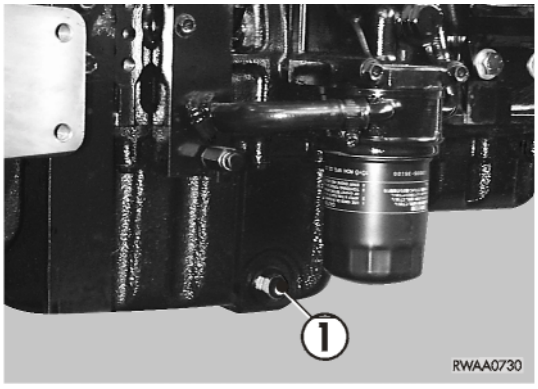
⚠ WARNING

Change the oil with machine on level ground and the loader arm raised and the safety lock engaged. After operating the machine, the engine oil is very hot and may cause burns. Let the engine cool down until it is about 40° to 45° C (104° to 113° F) before draining the oil. Oil that may be spilled during the change makes the ground slippery. Therefore, wear antislip shoes and immediately remove any trace of oil from the floor. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to antipollution regulations.

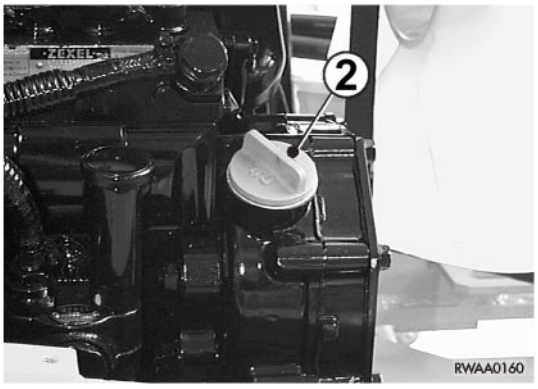
When changing the engine oil, also change the filter.

Proceed as follows:

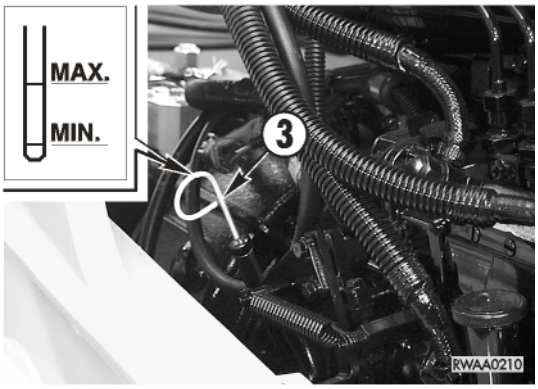
1. Open the engine hood.
2. Remove the oil pan drain plug (1) and let the oil flow into a container of sufficient capacity. Use a 19 mm wrench.



3. Remove the filler cap (2) so the oil can flow freely from the oil pan.
4. Change the engine oil filter.



5. Tighten the oil drain plug (1).
6. Add the specified quantity of new oil. Use the dipstick (3) to make sure that the oil level reaches the MAX level.
7. Reinstall the filler cap (2).
8. Start the engine and let it run for 5 minutes.
9. Turn off the engine and check the oil level again; add oil suitable for the ambient temperature if needed.
10. Close the engine hood.



CHANGE THE ENGINE OIL FILTER

⚠ WARNING

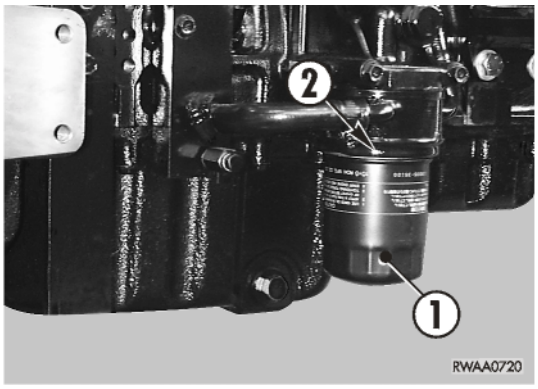
Immediately following machine operation, the engine oil is very hot and may cause burns. Let the engine cool down to about 40° to 45° C (104° to 113° F) before draining the oil. Oil that may be spilled during changes makes the floor slippery. Thus, wear antislip shoes and immediately remove any trace of oil from the floor. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.

Replace the oil filter every time the oil is changed.
Proceed as follows:

1. Unscrew and remove the old filter (1), using the special wrench that is provided.
2. Clean contact surface between the gasket and filter support (2).
3. Fill the new filter with engine oil, lubricate the gasket and then screw the filter on.
4. Give another half turn by hand.

Start the engine. Make sure that there are no leaks and that the oil pressure warning light goes out.

★ Do not use the filter wrench to tighten the filter or it will be damaged and cause an oil leak.

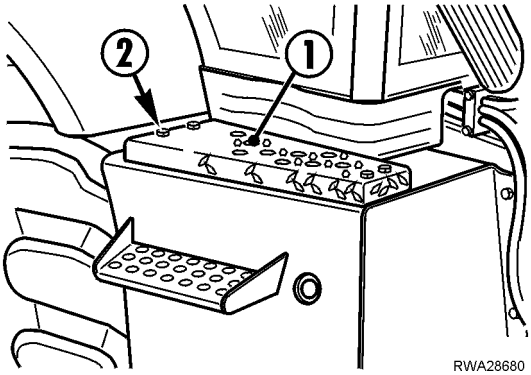


CHANGE THE HYDRAULIC OIL FILTER

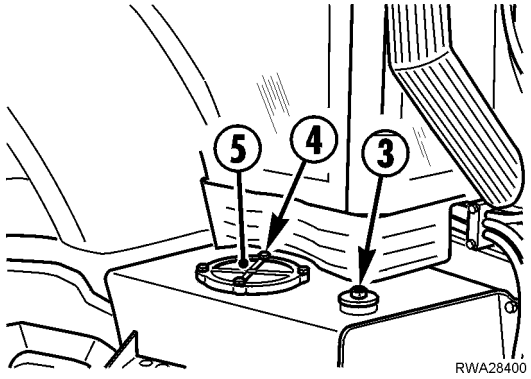
WARNING

After operating the machine, the hydraulic oil is very hot. Let the oil cool down until it is about 40° to 45° C (104° to 113° F) before changing it. The hydraulic system is pressurized. Thus, loosen the fill cap slowly to release any residual pressure inside the tank. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.

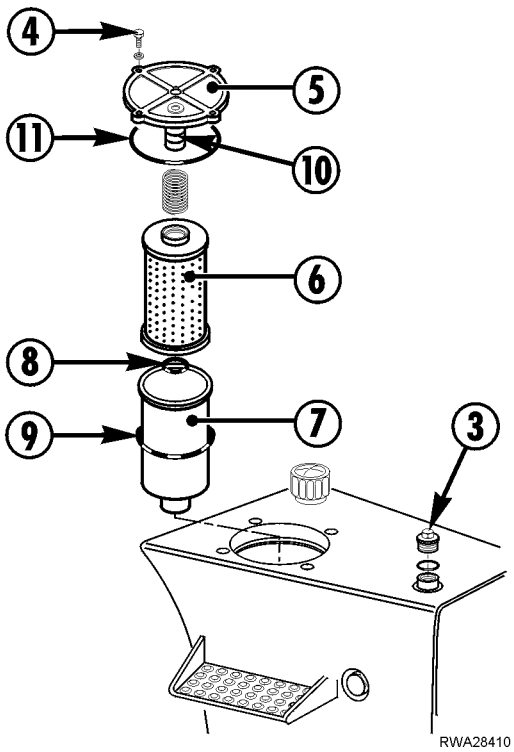
The filter is on the hydraulic system drain outlet. This filter prevents metal particles from circulating through the system, which would damage seals and scratch highly polished chrome rods. Using a 17 mm hexagon wrench, remove the screws (2). And then remove the upper platform (1) to access the hydraulic oil filter.



1. Using a 24 mm wrench, remove the filler cap (3).
2. Remove the screws (4) securing the filter cover (5).
3. Remove the cartridge (6).

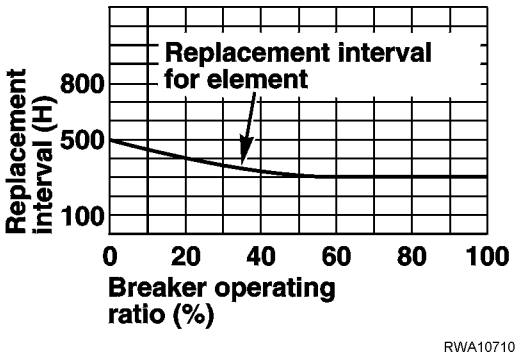


4. Using a 13 mm wrench, remove the filter casing (7).
5. Carefully clean filter casing (7), making sure that filter gasket (8), and casing gasket (9) are in perfect condition.
6. Clean the magnetic rings (10) on the cover.
7. Change the cartridge (6).
8. Reassemble unit by proceeding in the reverse order. Make sure that the cover (5) and gasket (11) are in perfect condition and is positioned in the cover seat.
9. Reinstall the upper platform (1) and secure it with the screws (2).

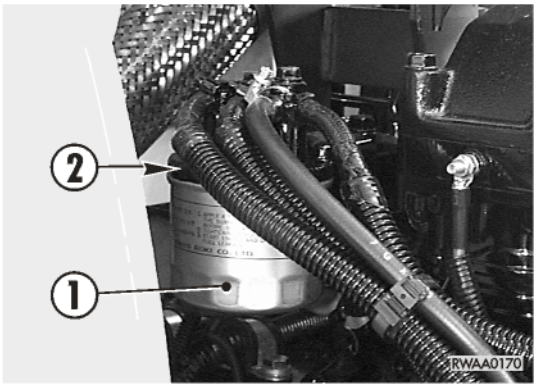


★ Hydraulic oil deteriorates more rapidly when machines use demolition hammers compared to digging operations. On new machines, replace the filter after the first 100 to 150 hours of operation. And for successive replacements, follow the schedule on replacement interval table.

★ If the machine uses HEES, replace the filter after the first 50 hours of operation.



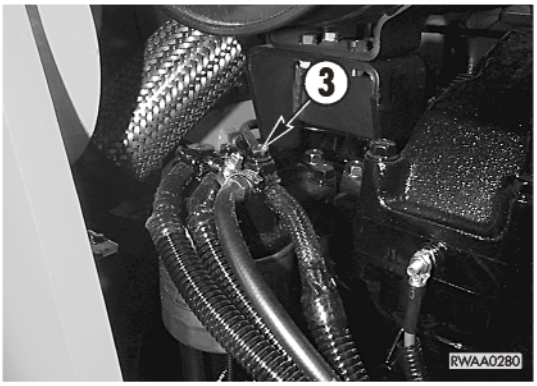
CHANGE THE FUEL FILTER



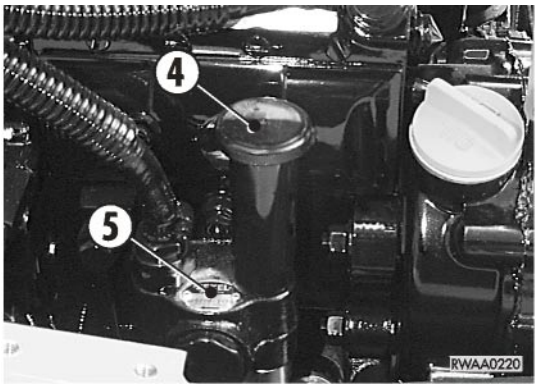
WARNING

Replace the filter element after the engine has cooled down from 40° to 45° C (104° to 113° F). Performing these operations may cause fuel to spill. Clean the spilled fuel immediately to prevent any risk of slipping or fire. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.

Open the engine hood to access the fuel filter and fuel pump.



1. Clean the external surfaces of the filter.
2. Unscrew and remove old filter (1) with the special wrench provided.
3. Clean inside of the head (2).
4. Lubricate the gasket of new filter and tighten thoroughly.
5. Give it another half turn by hand.
6. After filling the tank, bleed the fuel supply circuit.
   A. Turn ignition switch to ON position.
   B. Loosen the filter drain screw (3), using a 12 mm wrench.
   C. Completely unscrew the fuel pump (5) and knob (4).
   D. Operate knob (4) until fuel without air bubbles flows out of the filter head. Tighten the drain screw (3).
   E. Press the knob (4) and tighten it completely.
   F. Start the engine.



★ If fuel does not flow after operating the fuel pump lever, rotate the drive shaft one turn.

★ Do not let the starter run for more than 15 seconds. Wait at least 15 seconds before repeating the starting procedure.

★ If the engine starts and then stops or hesitates, check for any air in the system. If so, check the fuel filter, water separator, and fuel pump for leaks.

★ If the machine runs out of fuel, bleed the fuel system after refueling.

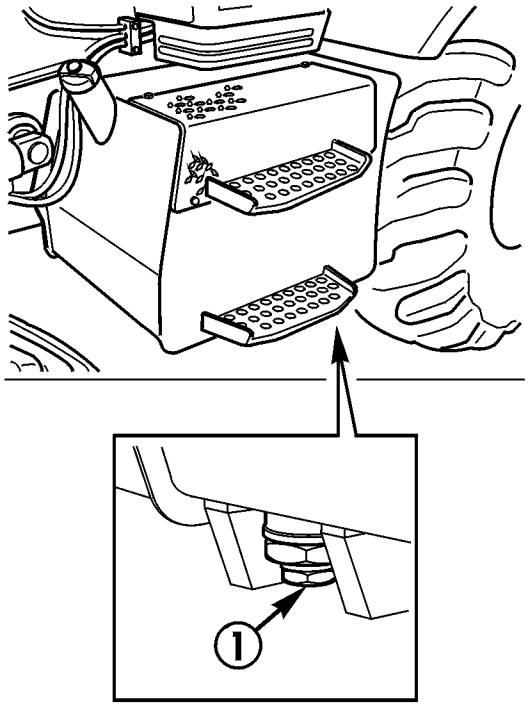
DRAIN THE FUEL TANK

WARNING

When draining the fuel tank, avoid spilling fuel because this situation may cause fires. If fuel accidentally spills, clean it up immediately to prevent slipping and fires.

This operation serves to remove impurities and condensation from the tank. Remove the lower plug (1) and wait until clean fuel flows out. Use a 17 mm wrench.

★ Drain the tank at the end of the shift to prevent condensation from freezing when the temperature is below 0° C (32° F).



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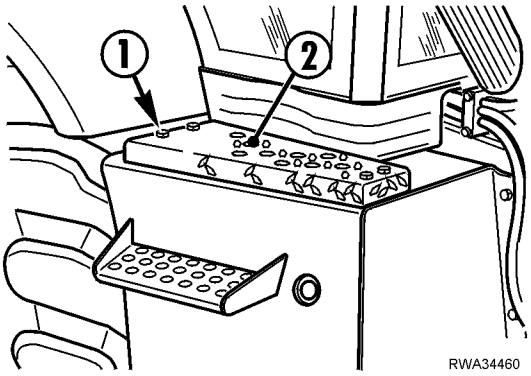
DRAIN THE HYDRAULIC OIL TANK

(Only for machines that use HEES — synthetic, biodegradable oil).

⚠ WARNING

Stop the engine, and position the machine for maintenance. With the engine stopped, moving the controls several times eliminates residual pressures from the hydraulic lines. Slowly loosen the tank cap to release residual pressure inside the tank. Let the oil cool down until it reaches about 40° to 45° C (104° to 113° F) before performing any maintenance. Immediately clean up any spills.

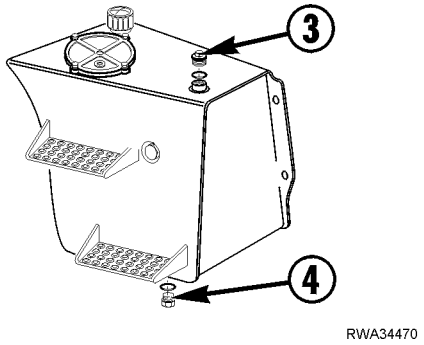


This operation serves to let condensation accumulated on the tank bottom to flow out of the tank itself.

Perform the following operations in the given sequence:

1. Remove the screws (1) and platform (2), using a 17 mm wrench.
2. Using a 24 mm wrench, loosen the filler cap (3) to release residual pressure from inside the tank.
3. Using a 41 mm wrench, remove the drain plug (4) and let condensation flown from the tank.
4. Reinstall the filler cap (3) and platform (2).

★ Drain the hydraulic oil tank at the end of each shift to prevent condensation from freezing inside the tank when the temperature is below 0° C (32° F).



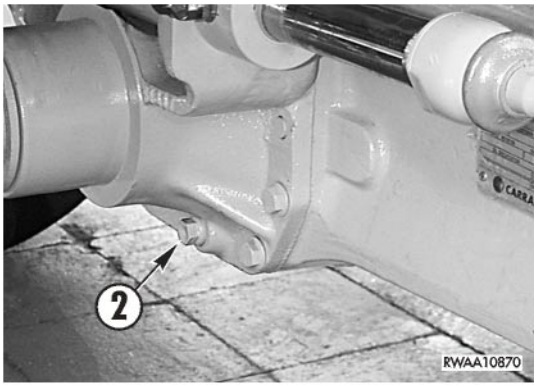
MAINTENANCE EVERY 1,000 HOURS

- Perform these operations together with those initiated every 50, 250, and 500 HOURS

CHANGE THE FRONT AXLE OIL

⚠ WARNING

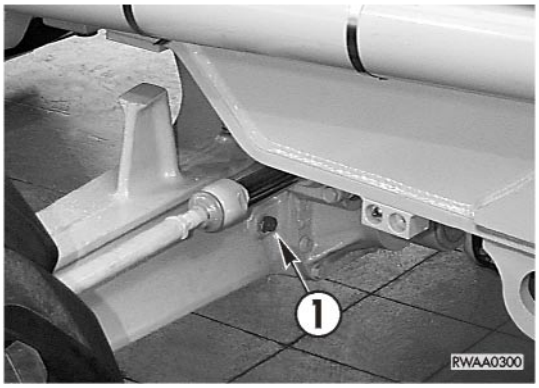
Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.



Perform this operation with the machine positioned on level ground. Drain the oil at operating temperature, so that any particles suspended in the oil drain with the oil.

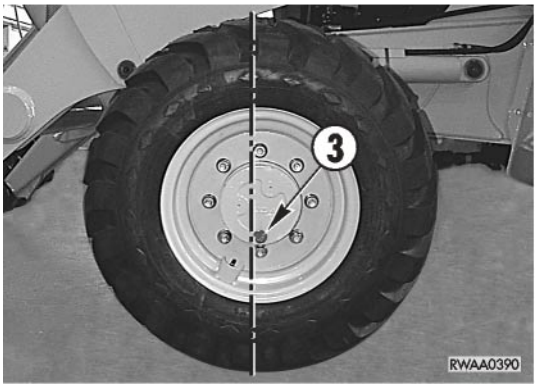
DIFFERENTIAL

1. Remove the drain plug (2) and let the oil flow into a container with suitable capacity. While the oil drains, remove the plug (1). Use a 17 mm wrench.
2. After draining the oil, reinstall the plug (2).
3. Pour the new oil through the hole (1) until the oil level is to the lower edge of the hole.
4. Reinstall the plug (1).



PLANETARY

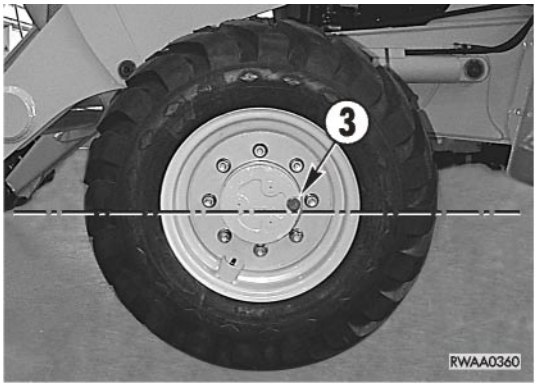
1. Move the machine until plug (3) is in a low end of the vertical axis (6 o'clock position).
2. Remove the plug (3) and let the oil flow into a container with suitable capacity, using a 17 mm wrench.



3. After draining the oil, move the machine until the plug (3) is on the horizontal axis (3 or 9 o'clock position).
4. Pour oil of the prescribed type through the hole (3) until the oil is at the lower edge of the hole.
5. Reinstall the plug (3).

★ Move the machine both forward and backward. Stop it to check the oil level again.

★ Always use the prescribed type of oil.

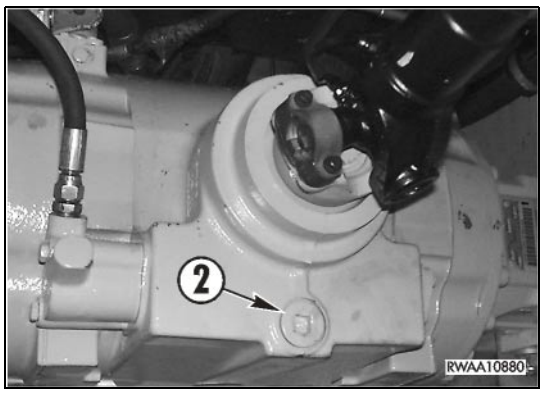


CHANGE THE REAR AXLE OIL

⚠ WARNING

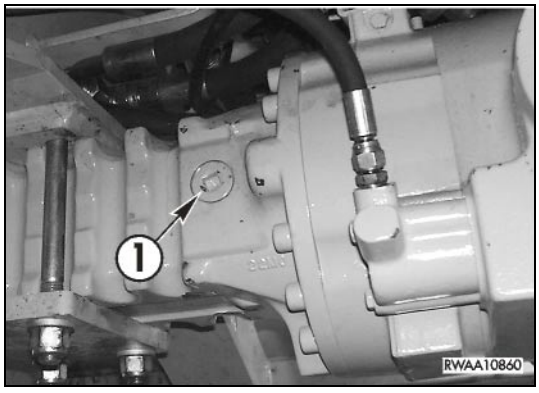
Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations.

Perform this operation with the machine positioned on level ground. Drain the oil at operating temperature, so that any particles suspended in the oil drain with the oil.



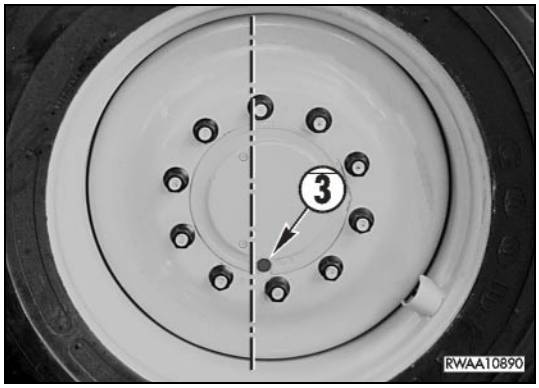
DIFFERENTIAL

1. Using a 1/2 in. square wrench, remove the drain plug (2) and fill plug (1). Opening the fill plug (1) acts as a vent, which allows the oil to drain faster into a container with suitable capacity.
2. After draining the oil, reinstall the plug (2).
3. Pour fresh oil of the prescribed type through the hole (1) until the oil level is at the lower edge of the hole (1).
   - ★ Both axle shafts are filled with oil. Before checking the differential oil level and installing the plug wait a few minutes to permit the uniform distribution of oil.
4. Install the plug (1).

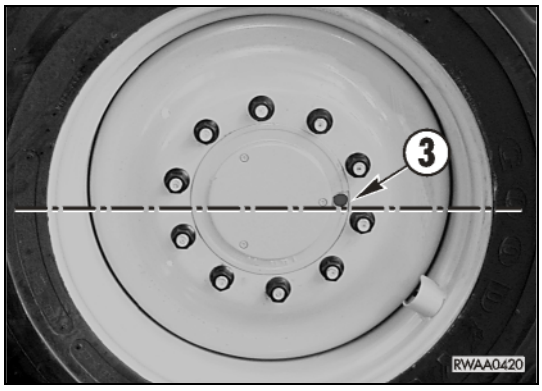


PLANETARY

1. Move the machine until the drain plug (3) is at the low end of the vertical axis (6 o'clock position).
2. Using a 1/2 in. square wrench, remove the plug (3) and let the oil drain into a container with suitable capacity.
3. After draining oil, move the machine until the plug (3) is positioned on the horizontal axis (3 or 9 o'clock position).
4. Pour oil of the prescribed type through the hole (3) until the oil reaches the lower edge of the hole (3).
5. Reinstall the plug (3).



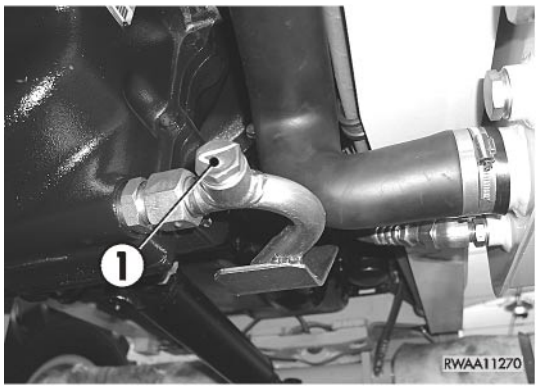
Move the machine both forward and backward and then stop it. Check the levels again. Always use oil of the prescribed type.



CHANGE THE TRANSMISSION OIL

⚠ WARNING

Perform this operation with the machine on level ground with the loader arm raised and the safety lock engaged. Draining the hydraulic transmission oil at operating temperature, which is very high, and may cause serious burns. Wear insulating gloves, goggles and safety shoes. Immediately clean up any spills. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.



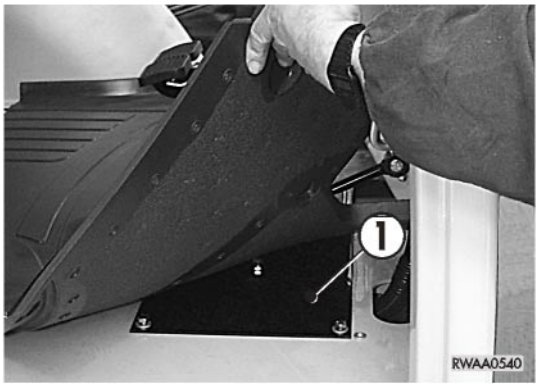
Proceed as follows:

1. Open the engine hood.
2. Using a 27 mm wrench, remove the drain plug (1) and let the oil drain into a container with suitable capacity.
3. Carefully remove the filter and replace it.
4. Reinstall the plug (1) and pour in fresh oil until it reaches the MIN mark on the dipstick (2).
5. Start the engine and let it idle while filling the system.
6. While the engine is idling, add oil until it reaches the MIN mark on the dipstick.
7. When oil temperature is about 50° C (122° F), add oil until it reaches the MAX mark on the dipstick.
8. Close the engine hood.

CHANGE THE TRANSMISSION FILTER

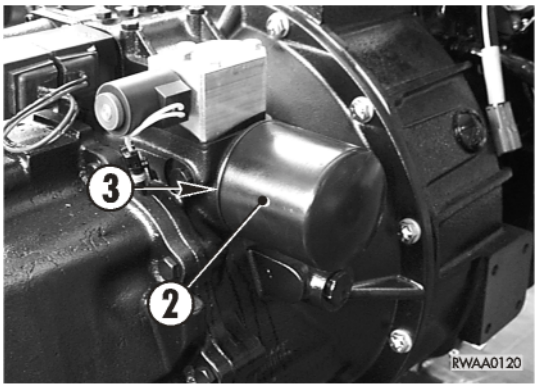
⚠ WARNING

After operating the machine, the transmission becomes very hot and may cause burns. Let the machine cool down before changing the filter. Oil spilled during filter replacement causes the floor to become slippery. Clean up any oil spills immediately. Wear antislip shoes as a precaution. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations.



Change the filter every time the transmission oil is changed.
Proceed as follows:

1. Raise the front mat and remove the cover (1), using a 13 mm wrench.
2. With the special wrench provided, unscrew the filter (2).
3. Clean the surface between the gasket and filter support (3).
4. Lubricate the gasket of the new filter.
5. Screw the new filter on until the gasket touches the support (3).
6. Turn the filter another half turn by hand.
7. Start the engine and let it idle until the engine is at operating temperature.



8. Add oil until it reaches the MAX mark on dipstick (4). Always add the specified oil.
9. Reinstall the cover (1).

CHECKING AND ADJUSTING ENGINE VALVE CLEARANCE

★ The check and adjustment of the engine valve clearance requires use of special tools. Thus, have this check performed by your Komatsu Dealer.

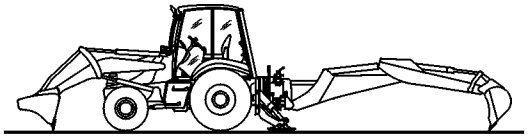
MAINTENANCE EVERY 2,000 HOURS

• Perform these operations together with those to be initiated every 50, 250, 500, and 1,000 HOURS.

⚠ WARNING

After stopping the engine:

- **Position the machine so that maintenance can be performed.**
- **Operate the controls more than once to release the residual pressures from the hydraulic lines.**
- **Slowly loosen the filler cap.**
- **Allow time for the oil to cool down until it is from 40° to 45° C (104° to 113° F) before performing any maintenance. Immediately clean up any spilled oil.**
- **Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.**



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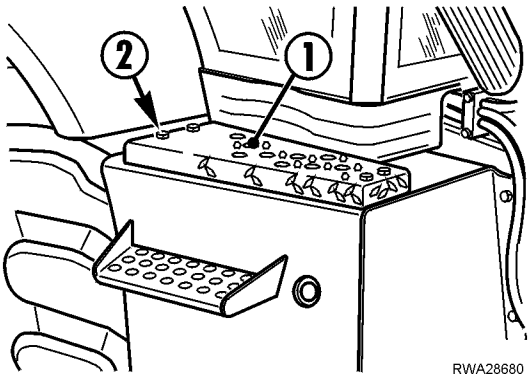
CHANGE THE HYDRAULIC OIL AND CLEAN THE SUCTION FILTER

★ On machines using HEES, change the oil after the first 500 hours of operation and every 2,000 hours thereafter. Or, at least once a year.

Using a 17 mm hexagon wrench, remove the screws (2). And then remove the upper platform (1) to access the filter.



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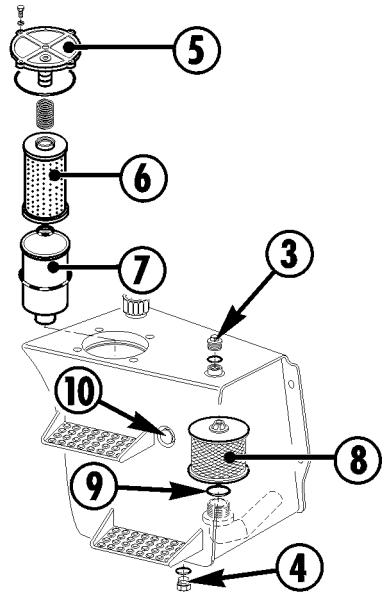
1. Using a 24 mm wrench, remove the filler cap (3).
2. Using a 41 mm wrench, remove the drain plug (4) and let the oil drain into a container with suitable capacity.
3. Using a 13 mm wrench, remove the upper flange (5), filter cartridge (6), and filter casing (7).
4. Remove strainer filter (8), complete with gasket (9) and clean it with light solvents (petrol, kerosene, diesel oil, etc.).
   - ★ Check the filter element and if it is not in perfect condition, replace it.
5. Reinstall the filter (8) with the gasket (9).
6. Replace the filter cartridge (6) and reassemble the unit.
7. Reinstall the drain plug (4).
8. Fill the hydraulic oil tank with the prescribed oil until it reaches the specified level (10).



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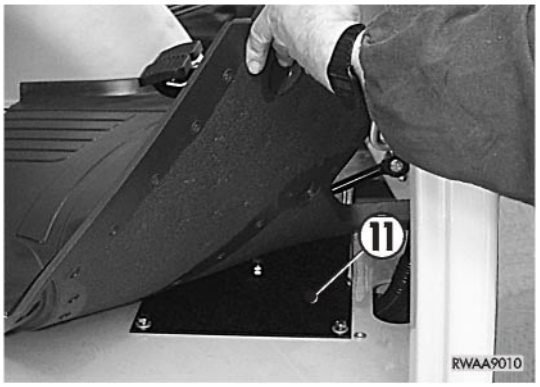
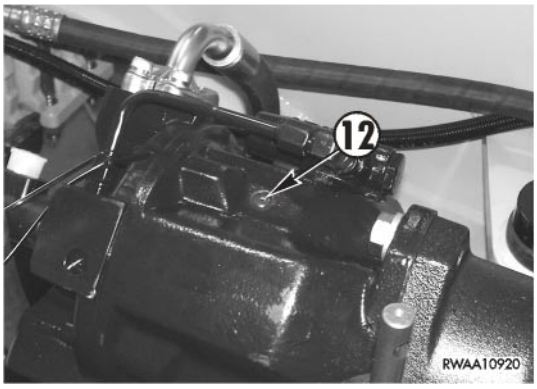
9. Raise the front mat and remove cover (11), using a 13 mm wrench.



10. Using a 3 mm setscrew wrench, loosen the bleeder plug (12) on the hydraulic pump until oil flows.
11. When no air bubbles can be observed as the oil flows out, tighten the bleeder plug (12).
12. Reinstall the cover (11).
13. Reinstall the filler cap (3).
14. To bleed the system, start the engine and operate the machine, making each piston moves several times.
15. Stop the machine in the maintenance position.
16. Check the oil level again and if necessary, add oil. Always use oil of the prescribed type.
17. Install the upper platform (1) with the screws (2).

❇ Do not attempt to start the engine with an empty fuel tank because the fuel pump would be damaged.



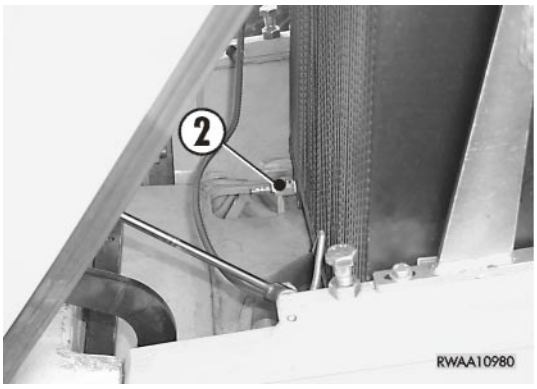
CHANGE THE COOLANT

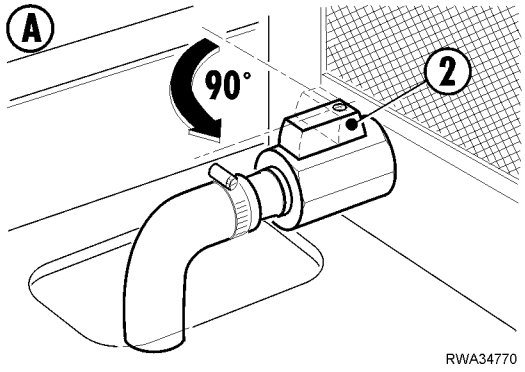
WARNING

After operating the machine, the coolant is very hot and under pressure and may cause serious burns. Wait until the coolant is from 40° to 45° C (104° to 113° F) before servicing the cooling system. Slowly loosen the radiator cap to release the residual pressure. Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.

Flush the cooling system to eliminate any calcium carbonate deposits.

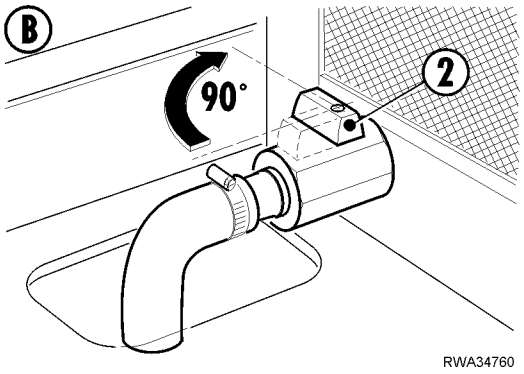
1. Open the engine hood.
2. Slowly loosen and then remove the radiator cap (1).
3. Open the radiator drain cock (2).



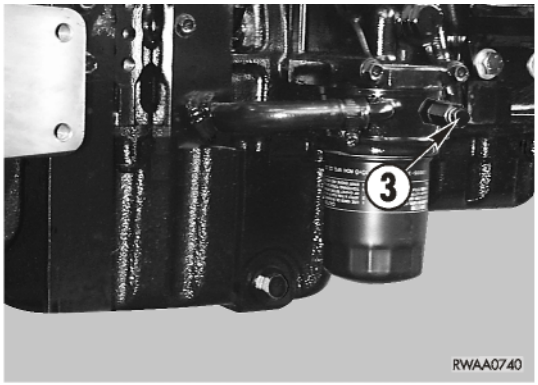


4. Using a 12 mm wrench, loosen the drain valve (3) on the filter head. Let the coolant drain into a container of suitable capacity.

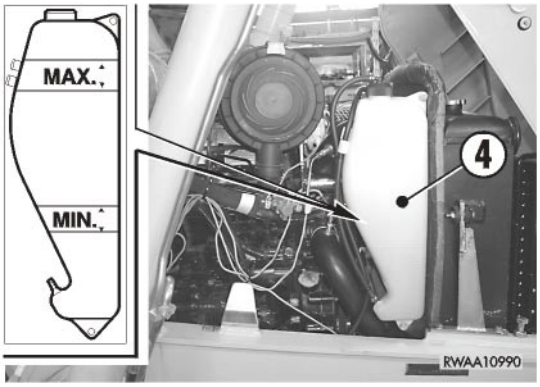
5. Close the radiator drain (2, fig.B).



6. Tighten the valve (3) on the filter head.
7. Fill the radiator with new coolant.
8. Start the engine and let it idle for a few minutes.
9. Check the coolant level again. Add coolant, if necessary.
10. Reinstall the radiator cap (1).



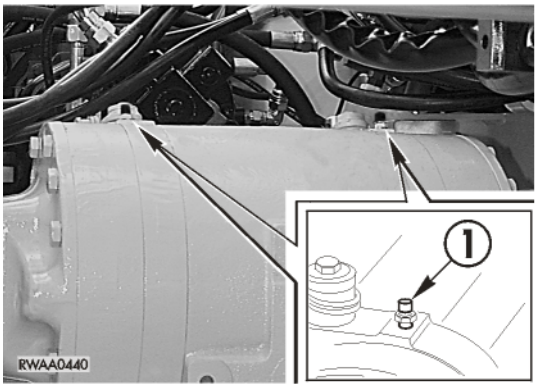
11. Fill the expansion tank (4) until the maximum level is reached, then close the engine hood.



CHANGE THE BRAKE FLUID

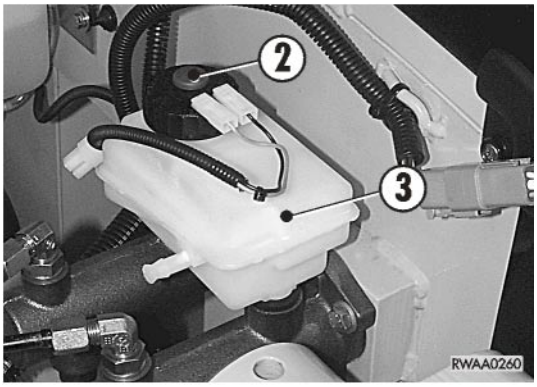
WARNING

Oil spilled may cause the floor to become slippery. Immediately clean up any spills.
Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.



Before changing the brake fluid, apply the brakes a few times to warm up the fluid. Change the brake fluid and bleed the brake system with the machine on level ground with the parking brake set. To drain the fluid and bleed the system, proceed as follows:

1. Attach a hose to each drain screw (1) and route the hose to a container.
2. Loosen the drain screws, using a 13 mm wrench.
3. Open the engine hood and remove cap (2) from the tank (3).
4. Operate the tandem brake pedals until no oil in the tank (3) exists.
5. Fill the tank (3) with new oil and keep pumping.
6. Fill the tank (3) again until the old oil (about 0.8 liters or 1.7 US pints) has been completely purged. Bleed the residual air.

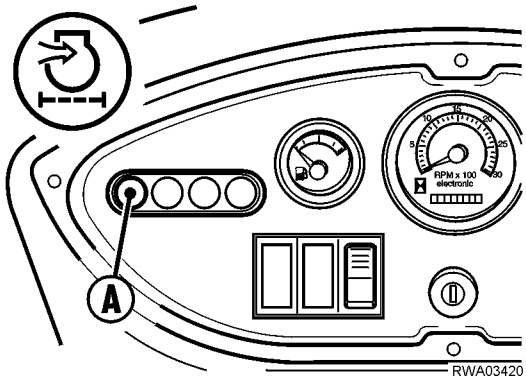


CHECK THE ALTERNATOR AND STARTER

- For any inspection and/or repair, contact your Komatsu dealer.
- If the engine is started frequently, perform this inspection every 1,000 hours of operation.

WHEN REQUIRED

CHECK, CLEAN, OR CHANGE THE AIR CLEANER CARTRIDGE

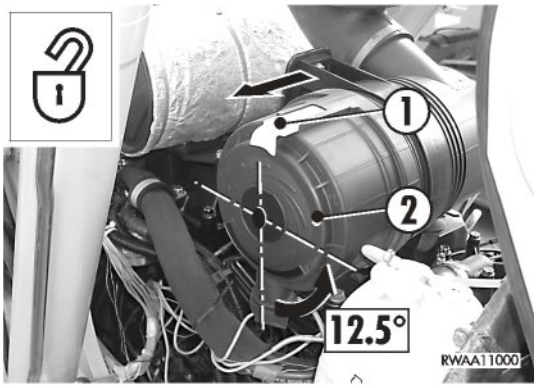


WARNING

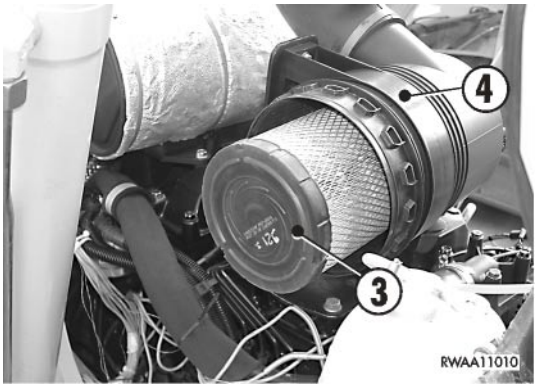
Remove the air cleaner only after stopping engine. Do not start the engine after removing the air cleaner. Always wear safety goggles during cleaning operations.

- ★ The air filtering system consists of a primary filtering element and a secondary cartridge.
- ★ The primary element can be cleaned with compressed air while the secondary cartridge must be replaced.
- ★ Clean the filter when the warning light (A) glows or flashes.

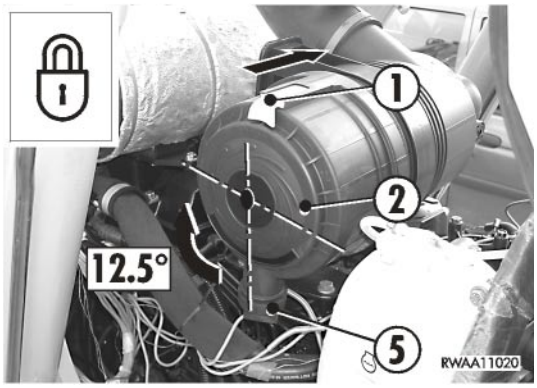
The air cleaner can be reached after raising the loader arm, engaging the mechanical safety lock and opening the engine hood. To clean the primary element, proceed as follows:



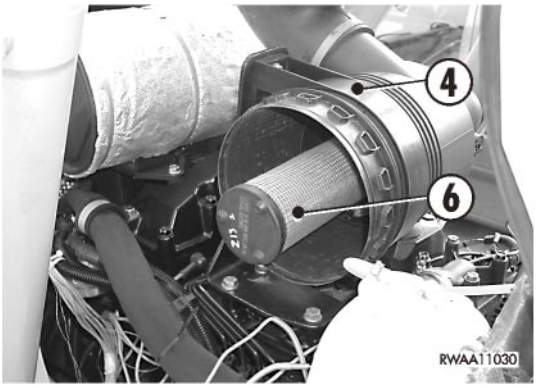
1. Release the safety lock (1), moving it toward the outside.
2. Rotate cover (2) counterclockwise about 12.5°.
3. Lift cover (2) and remove filter element (3).
4. Lightly tap filter element (3) on the palm of your hand, in a manner to remove the dust. Direct compressed air to the inner surface of the filter, keeping the air nozzle about 15 cm (5.9 in.) from the filter. Prevent pressure from exceeding 4 to 5 bars (58 to 73 PSI).
5. Clean the inside of filter case (4), taking care to prevent foreign debris from getting into the suction duct.
6. Reinstall the filter element (3), making sure that it is seated in its housing.



7. Reinstall the cover (2), rotating it clockwise approximately 12.5°. Make sure that the cover (2) is locked and that the ejector (5) is positioned vertically on the lower part.
8. After reassembling the unit, push the safety lock (1) towards the inside.
   - ★ If the warning light (A) glows after starting the engine, replace the primary filter element and the secondary cartridge.
   - ★ Replace the primary filter element after 6 cleaning operations or after one year. Every time the primary filter element is replaced, replace the secondary cartridge.



To change the secondary cartridge:
1. Remove the primary element.
2. Remove safety cartridge (6) and replace it with a new one.
3. After installing the safety cartridge (6) inside the filter case (4), make sure that it is seated in its housing.
4. Reassemble the unit as described above, making sure that all filter components are locked.
5. Push the safety lock (1) towards the inside.

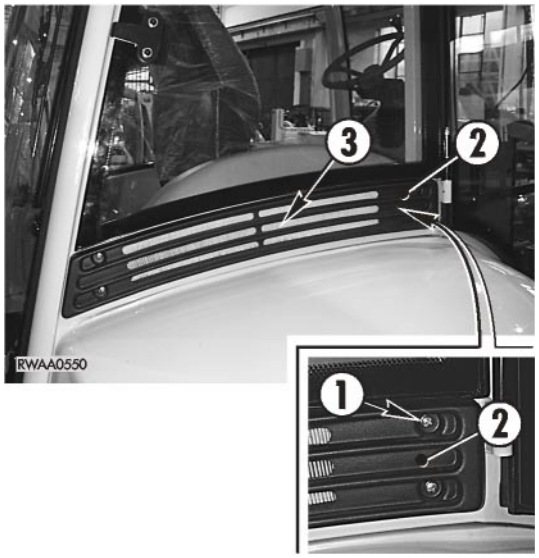


CHECK AND CLEAN CAB AIR FILTERS

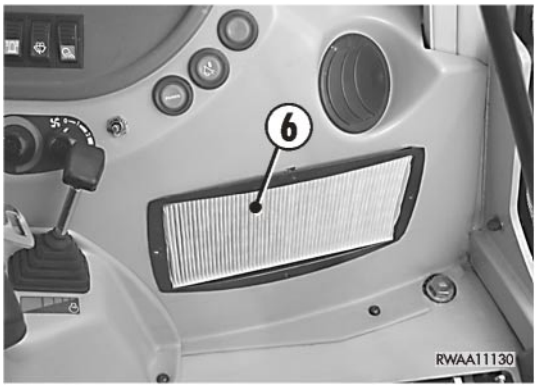
⚠ WARNING

Always wear safety goggles during cleaning operations.

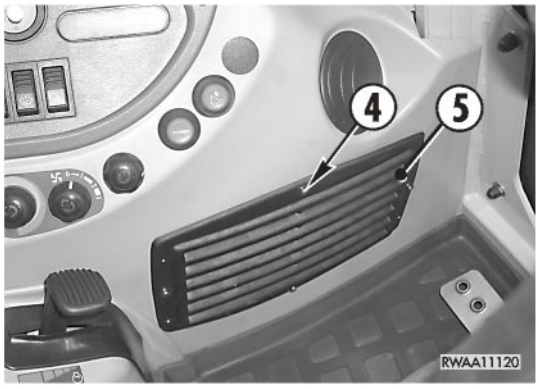
Outside air that enters the cab is filtered. This filter is on right side of the cab. The cab filter prevents impurities in the outside air from entering the cab. Whenever circulation decreases, clean the filter. The filter can be reached from outside of the cab. To clean the filter:
1. Remove: screws (1), external protection (2), and filter element (3).
2. Tap element lightly with the palm of your hand to remove any dust. Blow compressed air on the filter surfaces, keeping the air nozzle at about 15 cm (5.9 in.) from the filter. Make sure that pressure does not exceed 4 to 5 bars (58 to 73 PSI).
3. Clean the filter casing, taking care to prevent any foreign debris from entering the suction duct.
4. Reassemble the unit.



If the machine has air conditioning (3), an additional cab filter (6) exists for internal air recirculation.



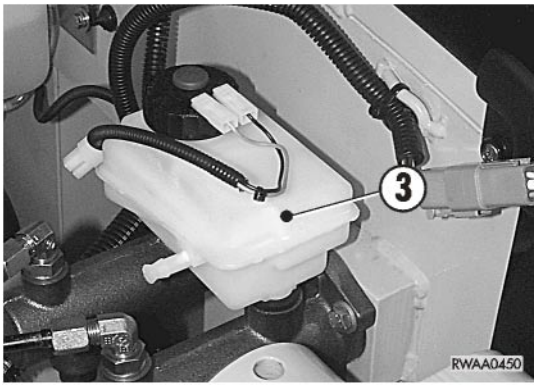
To clean the filter element:
1. Remove the: screws (4), outer guard (5), and filter element (6).
2. Tap the element lightly with the palm of your hand to remove dust. Direct compressed air onto the filter surfaces, keeping the air nozzle about 15 cm (5.9 in.) from the filter. Make sure that the air pressure does not exceed 4 to 5 bar (58 to 73 psi).
3. Clean the filter casing while preventing any foreign debris from entering the suction duct. Reassemble the unit.



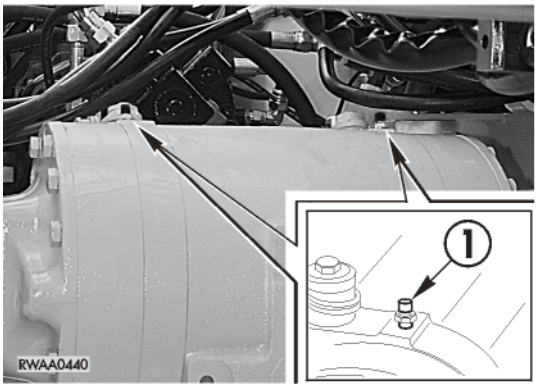
BLEED THE BRAKE SYSTEM

⚠ WARNING

Oil spilled on the floor may cause it to become slippery. Immediately clean up any spills.
Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.



This operation is important because it helps maintain the power and braking efficiency of the machine. Proceed as follows:
1. Make sure that fluid in brake tank (3) reaches the maximum level.
2. Depress each brake pedal and keep it depressed while loosening the drain screw (1) at each brake. Use a 13 mm wrench.
3. Keep the pedal depressed while tightening the drain screw (1).
4. Release the brake pedal. Wait a few minutes and repeat the operations described above until no air bubbles can be seen in the oil that flows out of the drain screw (1).
   - ★ When bleeding the system, attach a small hose to the bleeder screws (1). In order to collect the oil.
   - ★ Perform the bleeding for both braking units, disconnecting the tandem pedals from each other.
   - ★ Check the brake fluid frequently and add fluid as needed.
   - ★ When adding fluid, use only new fluid of the specified type.



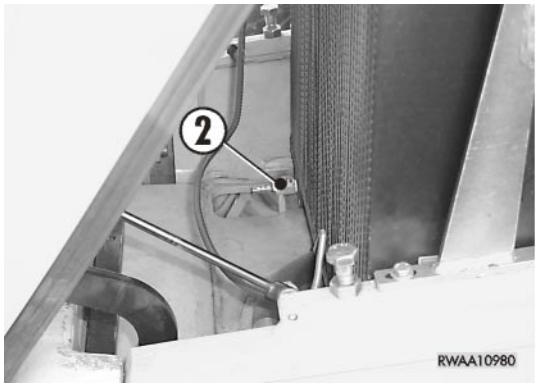
FLUSH THE COOLING SYSTEM

WARNING

Because the engine must be running to perform this operation, the operator must remain in the cab while another person performs the maintenance.
After stopping the machine, the coolant is very hot and under pressure. Let the engine cool down until it reaches about 40° to 45° C (104° to 113° F) before starting the flushing operations.

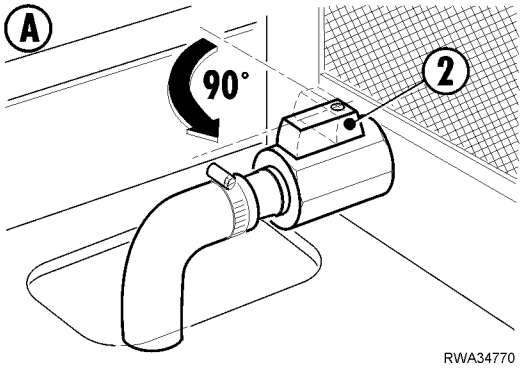
WARNING

Slowly loosen the radiator cap to release residual pressure. Engage all work equipment safety locks. Apply the parking brake and do not move the gearshift lever.
Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all antipollution regulations.

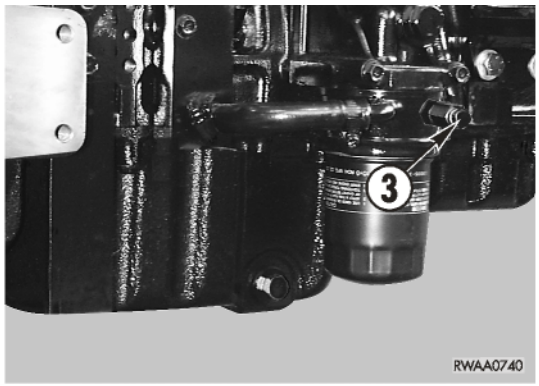


Whenever changing from water to antifreeze, flush the cooling system to eliminate or reduce the calcium deposits. Proceed as follows:

1. Open the engine hood.
2. Once the coolant is about 40° to 45° C (104° to 113° F), open the radiator drain (2).

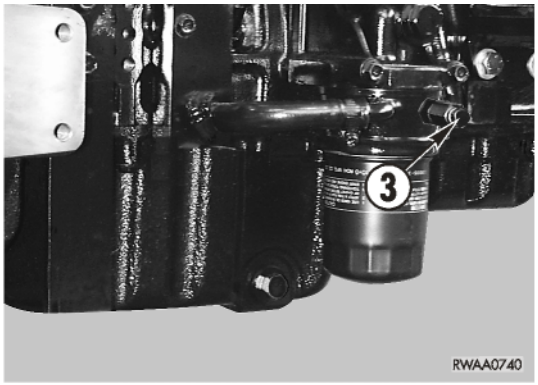


3. With a 12 mm wrench, loosen the drain valve (3) on the filter head.

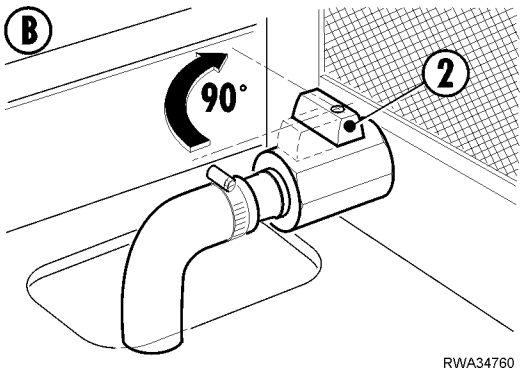


4. Loosen the radiator cap (1).
5. Let all the coolant flow out into a suitable container.

6. Tighten the valve (3) on the filter head.

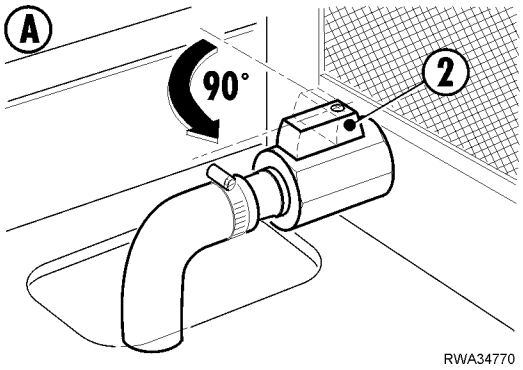


7. Close the radiator drain cock (2 in fig. B).
8. Pour scale remover into the radiator as recommended on the package. The cooling system holds about 14 liters (3.7 US gal). Fill the radiator with water.

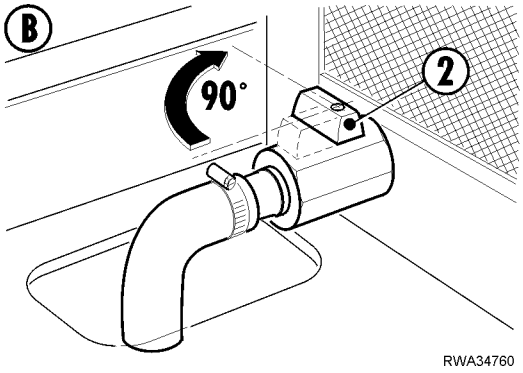


9. Start the engine and let it run at high RPMs for about 15 minutes.
10. Reduce the RPMs to idle.

11. Open the radiator drain (2 in Fig. A) and allow the scale-removing solution to flow into a suitable container. Place a hose in the radiator neck and allow water to run through the cooling system for at least 40 minutes.
12. Turn off the water supply and stop the engine. Let all the coolant drain into a suitable container.

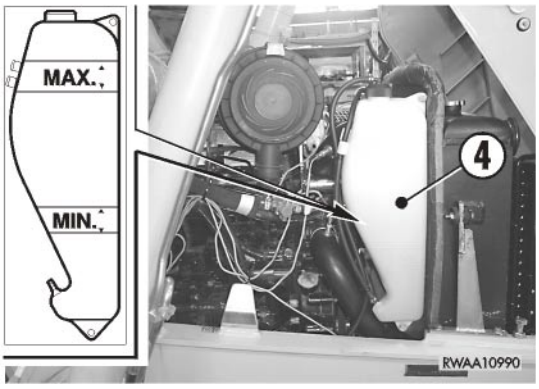


13. Close the radiator drain (2 in fig. B).
14. Fill the system with coolant.
15. Start the engine and after a few minutes check the coolant level in the radiator. If necessary, add more coolant before installing the radiator cap (1).



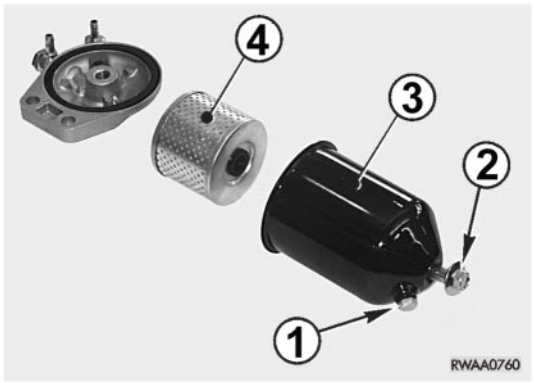
16. After draining the water from the expansion tank (4), flush the tank's inside. Fill the tank with coolant until it is between the MIN and MAX marks.
17. Close the engine hood.

★ Flush the cooling system more frequently if the water used contains a high quantity of calcium and magnesium carbonates (hard water).



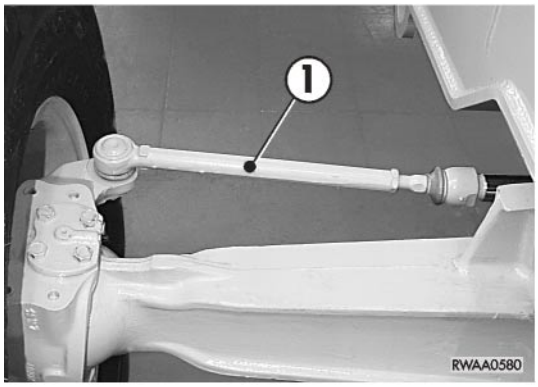
CLEAN THE WATER SEPARATOR

1. Loosen the screw (1) and drain the water from the separator into a container with suitable capacity. Use a 13 mm wrench.
2. Loosen the central screw (2).
3. Remove the bowl (3) and filter element (4). Use a 14 mm wrench.
4. Clean the inside of the pan and filter with diesel oil or oil.
5. Reinstall the filter (4) and bowl (3).
6. Tighten the screws (2 and 1).
7. Bleed the fuel supply circuit. See “CHANGE THE FUEL FILTER” on page 3-50.
   ★ Replace a clogged or damaged filter element.
8. Start the engine.



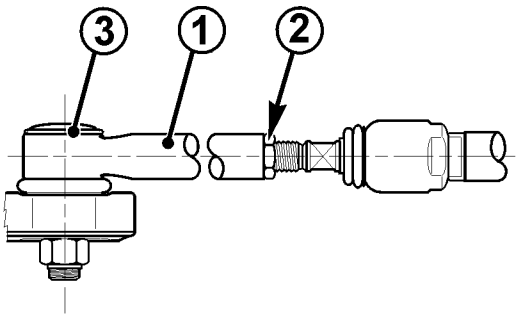
CHECK AND ADJUST THE FRONT WHEEL TOE-IN

The front wheel toe-in changes because of impacts or vibrations. The toe-in must be checked periodically to prevent the front tires from wearing excessively.



Check the condition of the tie rod end (3) on each side of the machine before measuring the front wheel toe-in. Shake the joint (3) with your hand. If the end (3) is excessively loose, replace it before taking the measurement.

The machine has been designed with a toe-in equal to 0 mm. If the measurement exceeds this specification, loosen the locknuts (2) with 27 and 19 mm wrenches. Split the measurement difference evenly between the right and left sides when making the adjustment. Turn the tie rod (1) on the left and right sides to obtain the specified 0 mm.



CHECK AND ADJUST THE PARKING BRAKE

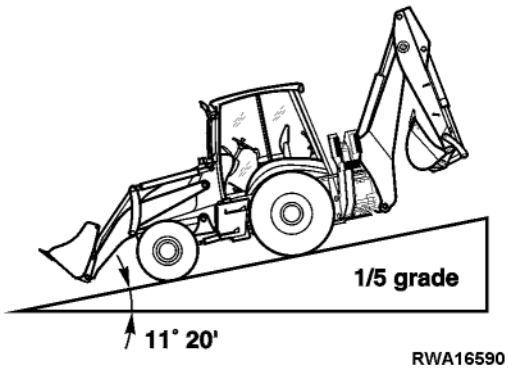
WARNING

During running-in, check the efficiency of the parking brake after the first 500 hours of operation.

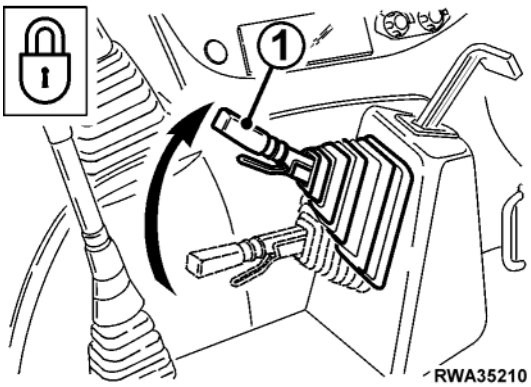
Before checking the parking brake operation, check the:

- Tire pressure.
- Service brakes.
- Machine is in operating condition.

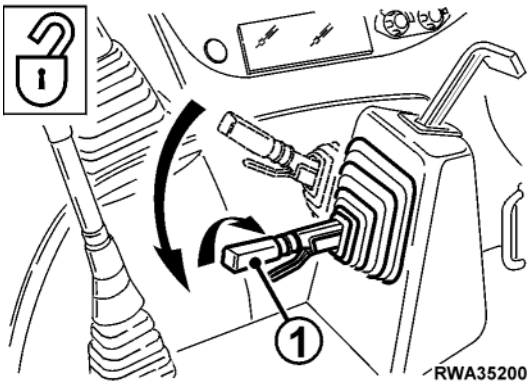
1. Start the engine.
2. Align the machine in a straight forward traveling position.
3. With an empty bucket, proceed up the 1/5 grade.
4. Stop the machine with the service brake.
5. Shift the gearshift lever to the neutral position (N)
6. Turn off the engine.



7. After squeezing the safety lever, pull the parking brake lever (1) up to the applied position. The parking brake should prevent the machine from moving. If not, apply the service brake to stop machine movement.



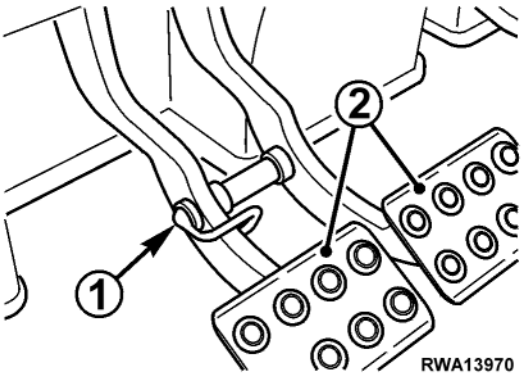
8. Keep the machine stopped on the slope with the service brake. Squeeze the safety lever and slowly lower the parking brake lever.
9. Rotate the end of the parking brake lever (1) counterclockwise from 2 to 3 turns.
10. Repeat steps 6 and 7 to verify the parking brake can hold the machine. If not, repeat step 8. Repeat this cycle until the parking brake prevents the machine from moving on the slope.



CHECK THE SERVICE BRAKE

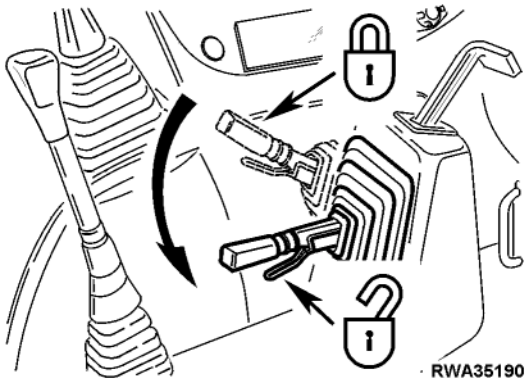
★ During run-in, check the service brake after the first 100 hours of operation.

★ Perform check with the machine positioned on firm, flat ground. Make sure that no people or obstacles are in the vicinity.



Perform this check after setting the work equipment in the travel or transport position, with all safety locks engaged.

1. Connect the tandem brake pedals (2) with pin (1).
2. Start the engine and release the parking brake.
3. Engage 2nd gear in the forward direction.
4. Accelerate until maximum speed is obtained.
5. Press the brake pedals, maintaining a constant force against them. The machine must brake smoothly and in a straight line. Otherwise, contact your Komatsu dealer.

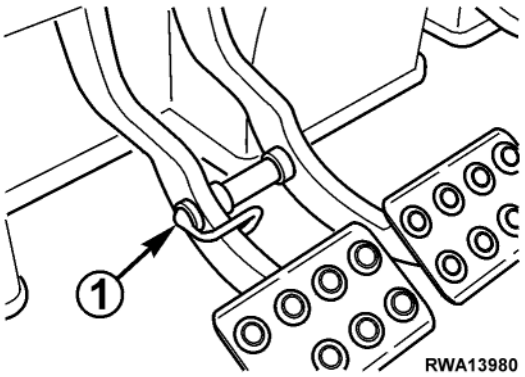


CHECK AND ADJUST BRAKE PEDAL STROKE

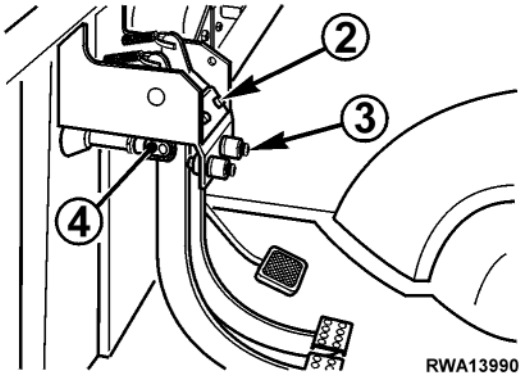
Perform this check when working on adjusting the brake pedal stroke to eliminate or prevent any problems.

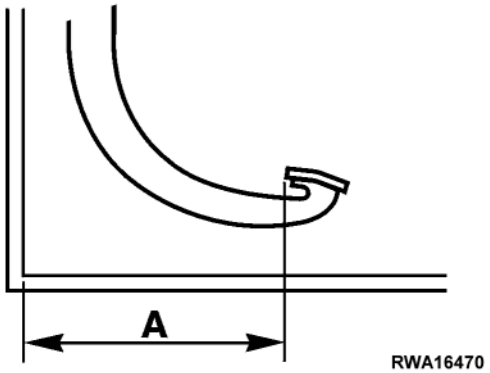
To check and adjust the brake pedal stroke, proceed as follows:

1. Insert connection pin (1) in order to couple the pedals.



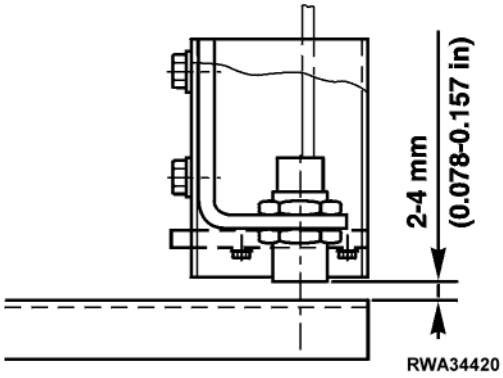
2. To adjust the brake pedal end-of-stroke: Depress the brake pedals so that measurement "A" equals 325 mm (12.8 in.) and then secure the pads (2) in this position. Use a 13 mm wrench.
3. To adjust the brake switches: Loosen the locknuts on the switches (3). Depress the brake pedals so that measurement "A" equals 306 mm (12 in.) and adjust the switches (3) to contact the brake pedal arms. Tighten the locknuts to secure the switches (3) in place. Use a 17 mm wrench.
4. To adjust the brake pump rods: Depress the brake pedals so that measurement "A" equals 294 mm (11.6 in.). With the brake pedal depressed, adjust the brake pump rods (4) until they touch the pumping pistons. Lock the brake pump rods in this position. Use a 22 mm wrench.





ADJUST AUTOMATIC RETURN OF FRONT BUCKET TO DIG POSITION

After dumping the load, the bucket automatically levels itself. This action automatically makes the bucket ready to dig while lowering it. The sensor is on the right dumping cylinder. The sensor determines the horizontal position of the bucket after the bucket dumping rod reaches the end of its stroke. Check that the sensor is from 2 to 4 mm (0.078 to 0.157 in.) from the rod.



MAINTENANCE INTERVALS WHEN DEMOLITION HAMMER USED

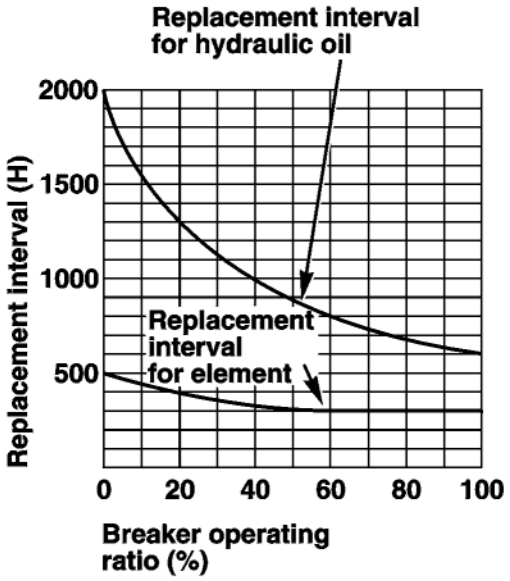
Compared to normal digging operations, hydraulic oil deteriorates more rapidly when using a demolition hammer. Thus, use the following maintenance plan when using the demolition hammer.

CHANGE THE HYDRAULIC OIL FILTER

For new machines, change the filter after the first 100 to 150 hours of operation. However, if the machine uses HEES, change the filter after the first 50 hours of operation. Always change the hydraulic oil filter when changing the hydraulic oil.

CHANGE THE HYDRAULIC OIL

If the machine uses organic hydraulic oil, change it according to the intervals specified in the table at the right. If the machine uses HEES, change the oil after the first 500 hours of operation. After the initial oil change, use the table to the right to determine the intervals.



RWA10900

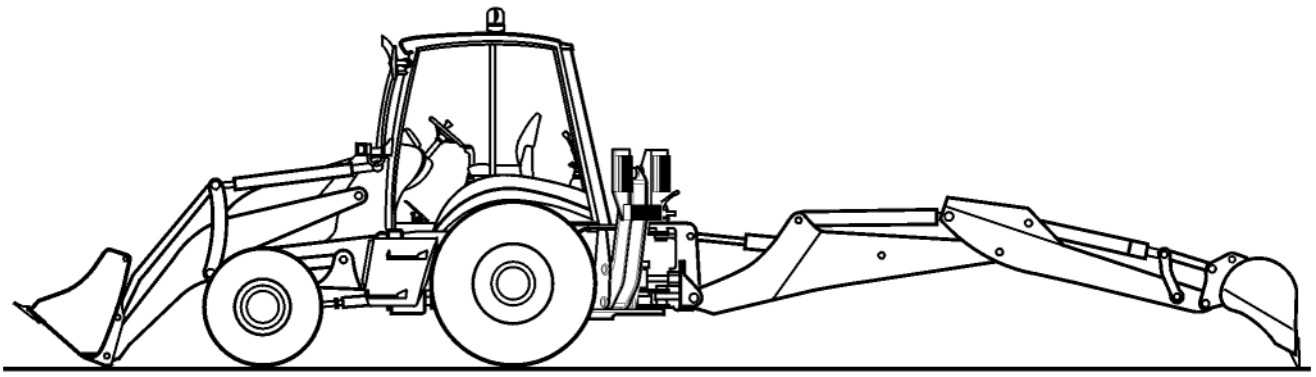
LONG-TERM STORAGE

BEFORE STORAGE

⚠ WARNING

When draining the fuel, do not smoke or have exposed flames near the machine. Place a container under the machine to collect the fuel. Clean up any spilled fuel immediately.

★ When the machine is not used, position the work equipment as shown to prevent the hydraulic rods from rusting.



RWA34670

Before storing the machine for a long time, perform the following tasks:

1. Clean the machine thoroughly.
2. In spots where the paint has chipped off, repaint where necessary to prevent oxidation.
3. Insert supports under the axles to avoid overloading them, and to avoid any deformation of the tire sidewalls.
4. Drain and change all fluids and lubricants (hydraulic, brake, axles, reduction gears, transmission, and engine).
5. Replace all filters with new ones (air cleaner, engine oil filter, hydraulic system filters, fuel filter).
6. Drain the coolant from the cooling system and then fill it with a corrosion inhibitor (permanent fluid).
7. Drain the fuel tank and then fill it with at least 10 liters (2.6 US gal) of special washing and protecting fuel.
8. Let the engine run for about 10 minutes so the special protecting fuel coats the filters, injection pump, and fuel lines. This step prevents the injection pump and injectors from seizing during storage.
9. Stop the engine and fill the fuel tank to protect the inside of the fuel tank from rusting.
10. Remove the battery from the machine. Check the electrolyte level. Add water to the specified level. Ensure that the battery is fully charged. If not, charge the battery until it is fully charged. Store the battery at room temperature (72° F or 22° C).
11. Grease the hydraulic cylinder rods.
12. Seal the end of the exhaust pipe with duct tape.
13. With the fuel tank cap installed, place duct tape around the cap to prevent any moisture from entering the tank.
14. Move the gearshift lever to the neutral position.
15. Engage the equipment control safety locks.
16. Hang a warning notice on the steering wheel to indicate the condition of the machine.
17. Lock the cab doors, fuel tank cover, and engine hood.
18. Shelter the machine from the elements.

DURING STORAGE

⚠ WARNING

The rust-prevention treatment contains poisonous vapors. Thus, when applying the rust treatment while indoors, open the building's windows or doors.

Start the engine and move the machine a short distance once a month. This action coats all moving parts and surfaces with a fresh oil film to prevent rusting. Also, charge the battery, if necessary.

REMOVING FROM STORAGE

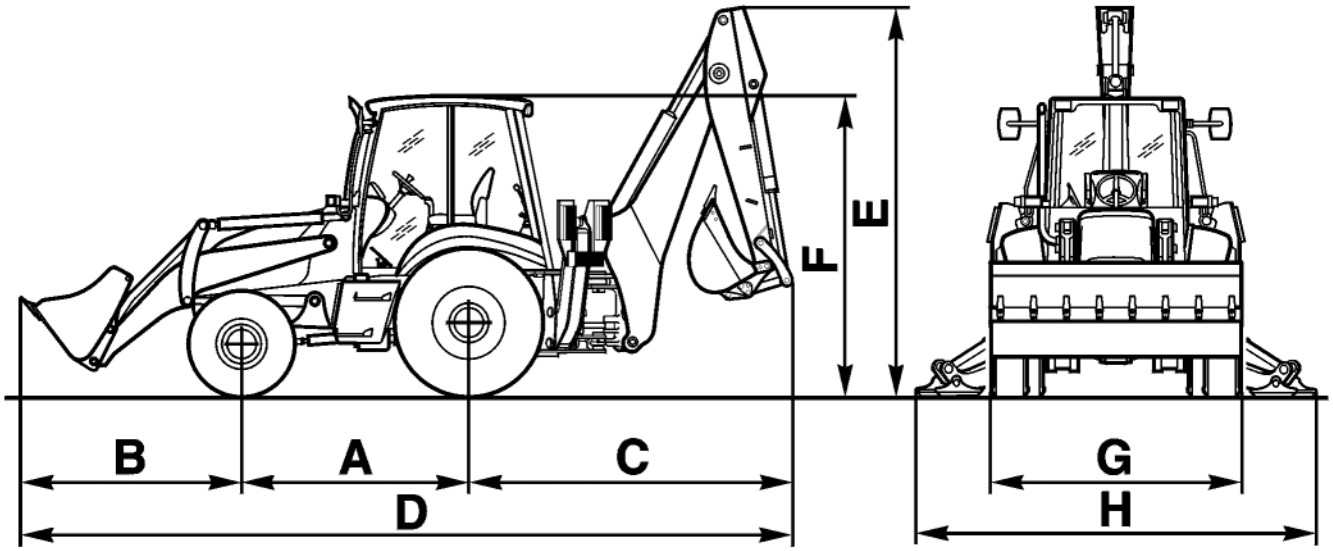
★ If the machine is stored without performing the monthly rust-prevention treatment, have maintenance performed by your Komatsu dealer.

Before using the machine after a long period of storage, proceed as follows:
1. Remove seals from the exhaust pipe and around the fuel tank cap.
2. Check all fluid levels (engine oil, coolant, fuel, hydraulic system oil).
3. Make sure the battery is fully charged and install it in the machine.
4. Disconnect the engine stop solenoid.
5. Turn the ignition key to the start position, but do not start the engine. Keep the key at the start position until the engine oil pressure warning light goes out. This action circulates the lubricating oil.
6. Reconnect the stop solenoid valve and start the engine. If the engine does not start, the fuel may have lost its volatility. If so, drain the fuel tank and refill the tank with new fuel.
7. Let the engine run at about 1,200 RPM for about 15 minutes.
8. While the engine is warming up, check the tire pressure and remove the grease from the hydraulic cylinder rods.
9. Before moving the machine, make sure that instruments, lights, direction indicators, and brake stoplights work properly.
10. Slowly move all the work equipment as soon as possible to warm up the hydraulic oil.
11. Move the machine at low speed and apply the brake a few times to allow the braking surfaces to seat.

SPECIFICATIONS

TECHNICAL DATA

STANDARD OVERALL DIMENSIONS



RWA18200

Pos.	WB140PS-2 Standard	WB140PS-2 Telescopic Arm	WB150PS-2 Standard	WB150PS-2 Telescopic Arm
A	2175 mm (7 ft. 2 in.)	2175 mm (7 ft. 2 in.)	2175 mm (7 ft. 2 in.)	2175 mm (7 ft. 2 in.)
B	2080 mm (6 ft. 10 in.)	2080 mm (6 ft. 10 in.)	2080 mm (6 ft. 10 in.)	2080 mm (6 ft. 10 in.)
C	2945 mm (9 ft. 8 in.)	2940 mm (9 ft. 8 in.)	3015 mm (9 ft. 8 in.)	2940 mm (9 ft. 8in.)
D	7200 mm (23 ft. 7 in.)	7195 mm (23 ft. 7 in.)	7270 mm (23 ft. 10 in.)	7195 mm (23 ft. 7 in.)
E	3625 mm (11 ft.11 in.)	3630 mm (11 ft. 11 in.)	3625 mm (11 ft. 11 in.)	3630 mm (11 ft. 11 in.)
F	2750 mm (9 ft. 0 in.)	2750 mm (9 ft. 0 in.)	2750 mm (9 ft. 0 in.)	2750 mm (9 ft. 0 in.)
G	2320 mm (7 ft. 8 in.)	2320 mm (7 ft. 8 in.)	2320 mm (7 ft. 8 in.)	2320 mm (7 ft. 8 in.)
H	3780 mm (12 ft. 4 in.)	3780 mm (12 ft. 4 in.)	3780 mm (12 ft. 4 in.)	3780 mm (12 ft. 4 in.)

TECHNICAL CHARACTERISTICS WB140PS-2N

TOTAL MASS

Minimum total mass . . . . . 7,400 kg (16,314 lbs.)
Maximum total mass . . . . . 8,800 kg (19,400 lbs.)

STANDARD BUCKET CAPACITY

Front bucket capacity (SAE) . . . . . 1.03 m^3 (1.30 yd^3)
Backhoe bucket capacity (SAE) . . . . . 0.20 m^3 (0.26 yd^3)

TURBOCHARGED ENGINE

Komatsu diesel engine model S4D106-1FA
Maximum power (2,200 RPM EEC 80-1269) . . . . . 64.1 kw (81.8 HP)
Maximum torque (1,500 ±100 RPM EEC 80-1269) . . . . . 330 Nm (243 lb. ft.)

ELECTRICAL SYSTEM

Alternator 12V
Electrical output . . . . . 80 A
Ground . . . . . Negative
Battery . . . . . 155 Ah - 12V
Starter . . . . . 3.0 kW

TRAVEL SPEEDS

★ Calculated with 18.4/26 tires and engine at 2,200 RPM.

	FORWARD				REVERSE			
Gears	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**
km/h	6	11	21	39	6	11	21	39
m/h	3.8	6.8	13	24.2	3.8	6.8	13	24.2

TIRES

	Size	**Make**	**Inflation Pressure**
Front	14-17.5 NHS PR 10	Goodyear	3.2 bar (46 PSI)
Rear	19.5 L24 PR 10	Goodyear	2.2 bar (32 PSI)

TECHNICAL CHARACTERISTICS WB150PS-2N

TOTAL MASS

Minimum total mass . . . . . 7,400 kg (16,314 lbs.)
Maximum total mass . . . . . 8,800 kg (19,400 lbs.)

STANDARD BUCKET CAPACITY

Front bucket capacity (SAE) . . . . . 1.03 m^3 (1.30 yd^3)
Backhoe bucket capacity (SAE) . . . . . 0.20 m^3 (0.26 yd^3)

TURBOCHARGED ENGINE

Komatsu diesel engine model S4D106-1FA
Maximum power (2,200 rpm EEC 80-1269) . . . . . 72 kw (96.5 HP)
Maximum torque (1,500 ±100 rpm EEC 80-1269) . . . . . 375 Nm (276 lb. ft.)

ELECTRICAL SYSTEM

Alternator 12V
Electrical output . . . . . 80 A
Ground . . . . . Negative
Battery . . . . . 155 Ah - 12V
Starter . . . . . 3.0 kW

TRAVEL SPEEDS

★ Calculated with 18.4/26 tires and engine at 2,200 RPM.

	FORWARD				REVERSE			
Gears	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**
km/h	6	11	21	39	6	11	21	39
m/h	3.8	6.8	13	24.2	3.8	6.8	13	24.2

TIRES

	Size	**Make**	**Inflation Pressure**
Front	14-17.5 NHS, 10 PR	Goodyear	3.2 bar (46 PSI)
Rear	19.5 L24, 10 PR	Goodyear	2.2 bar (32 PSI)

LIFTING CAPACITIES

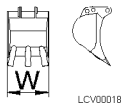
WARNING

Perform the lifting operations only with the machine positioned on firm level ground.

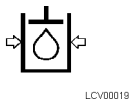
A - Standard arm length: 1,850 mm (72.8 in.)
B - Longer arm length: 2,150 mm (84.6 in.)

C - Telescopic arm retracted: 1,850 mm (72.8 in.)
D - Telescopic arm extended: 2,150 mm (84.6 in.)

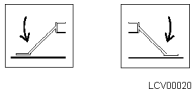
E - Standard backhoe bucket width and mass. . . . . W = 600 mm (23.6 in.) / 160 kg (353 lbs.)



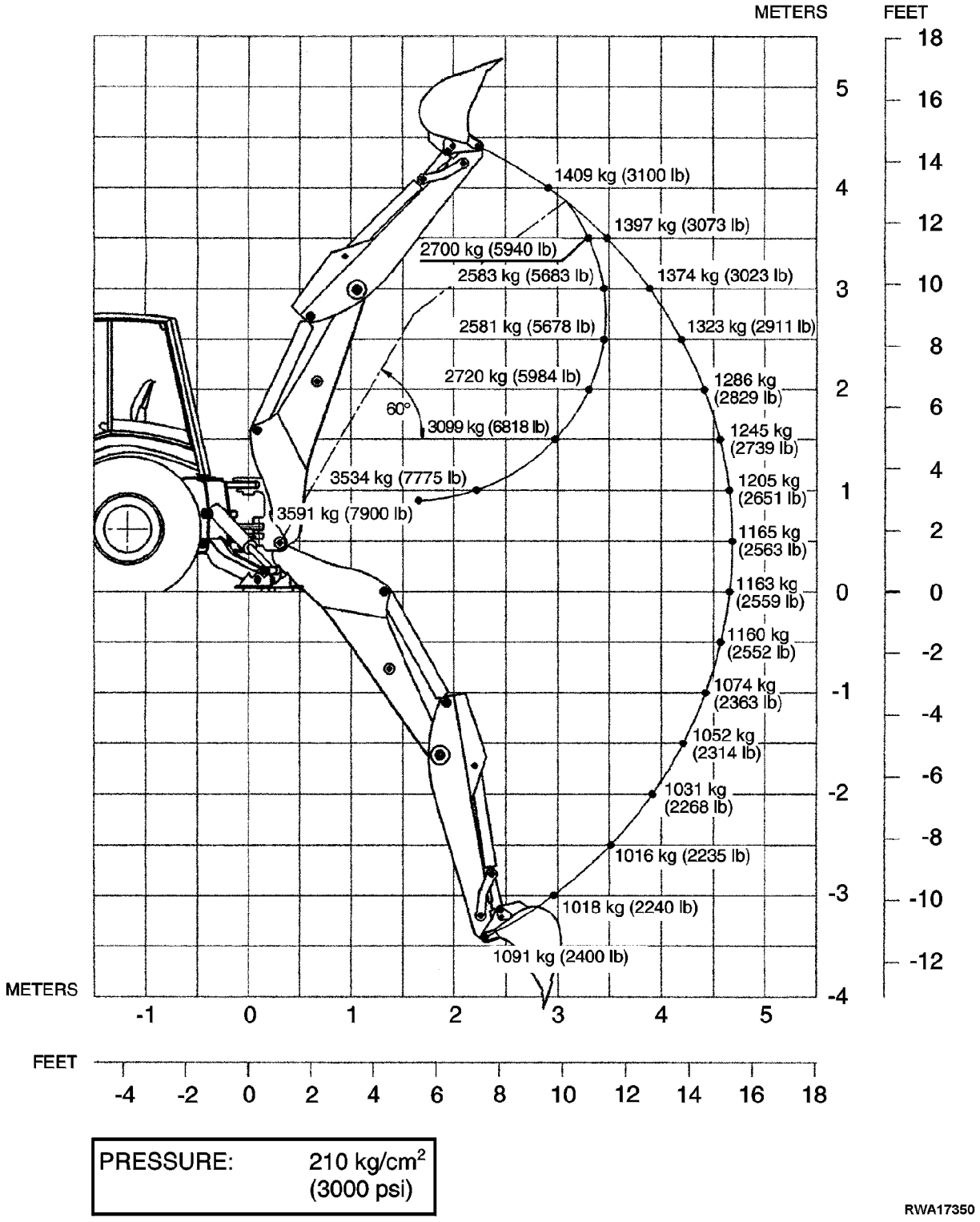
F - Operating hydraulic pressure. . . . . .



G -Lowered stabilizers . . . . . .

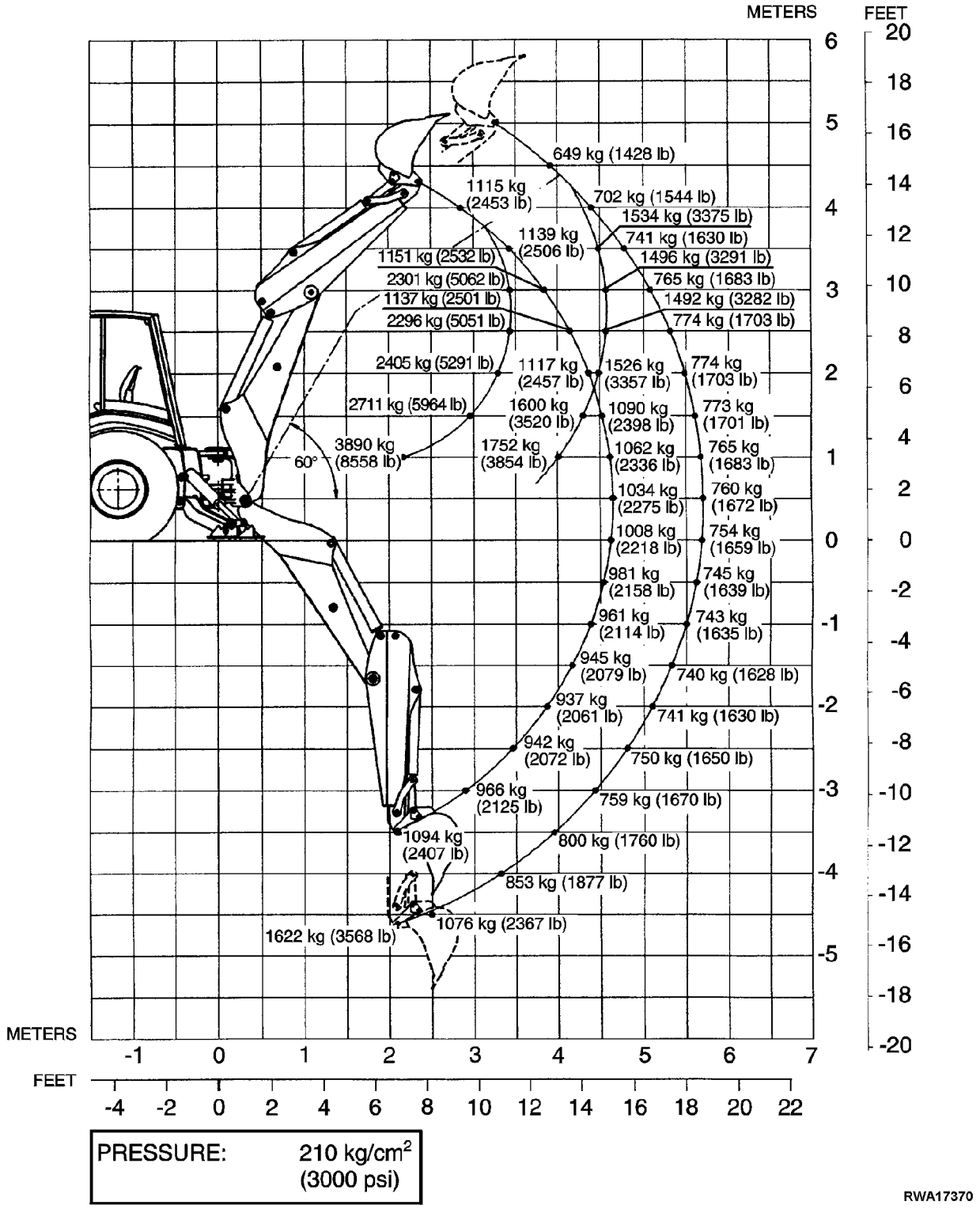


LIFTING CAPACITY — WB140PS-2N

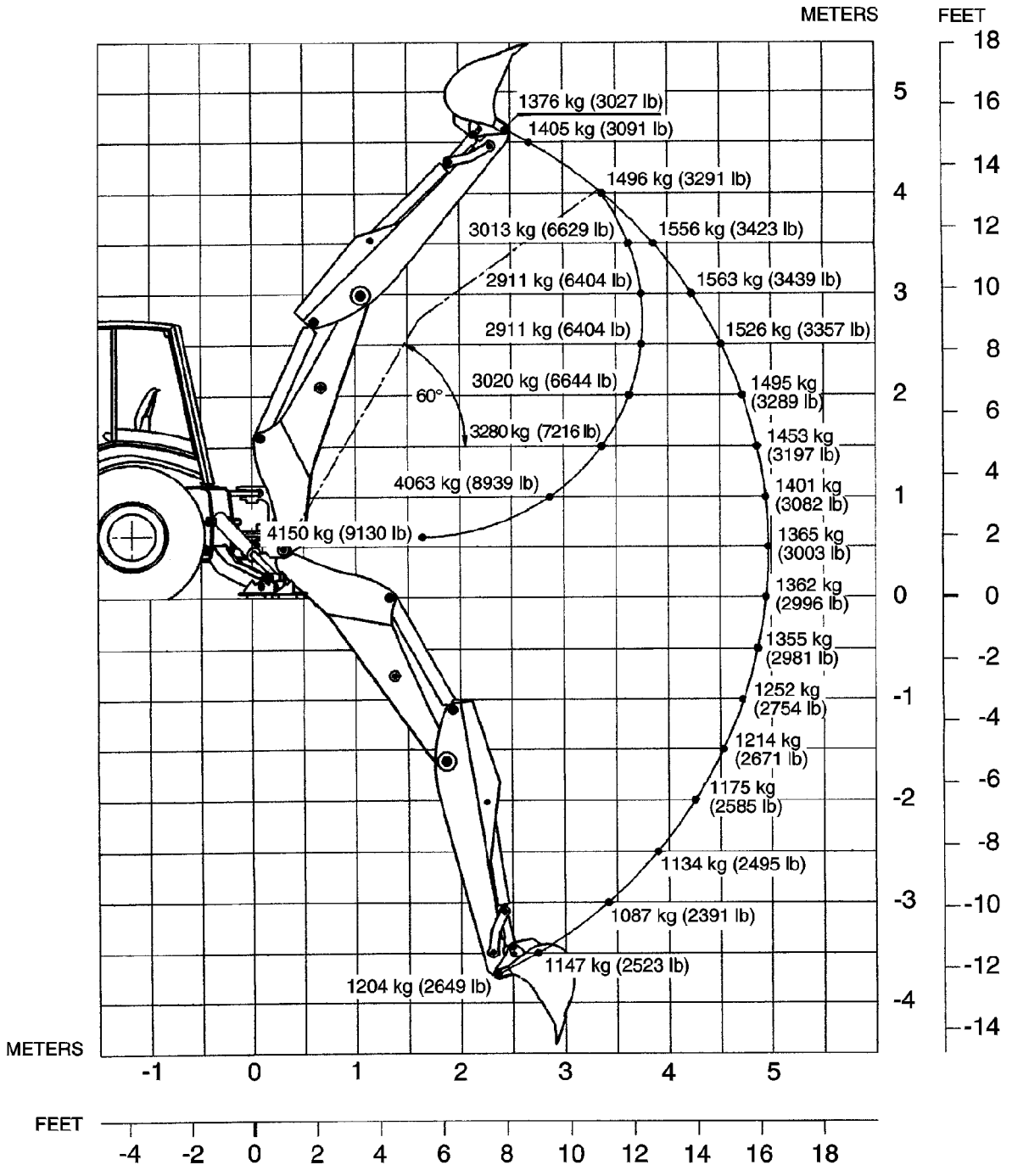


PRESSURE:	210 kg/cm^2 (3000 psi)

RWA17350

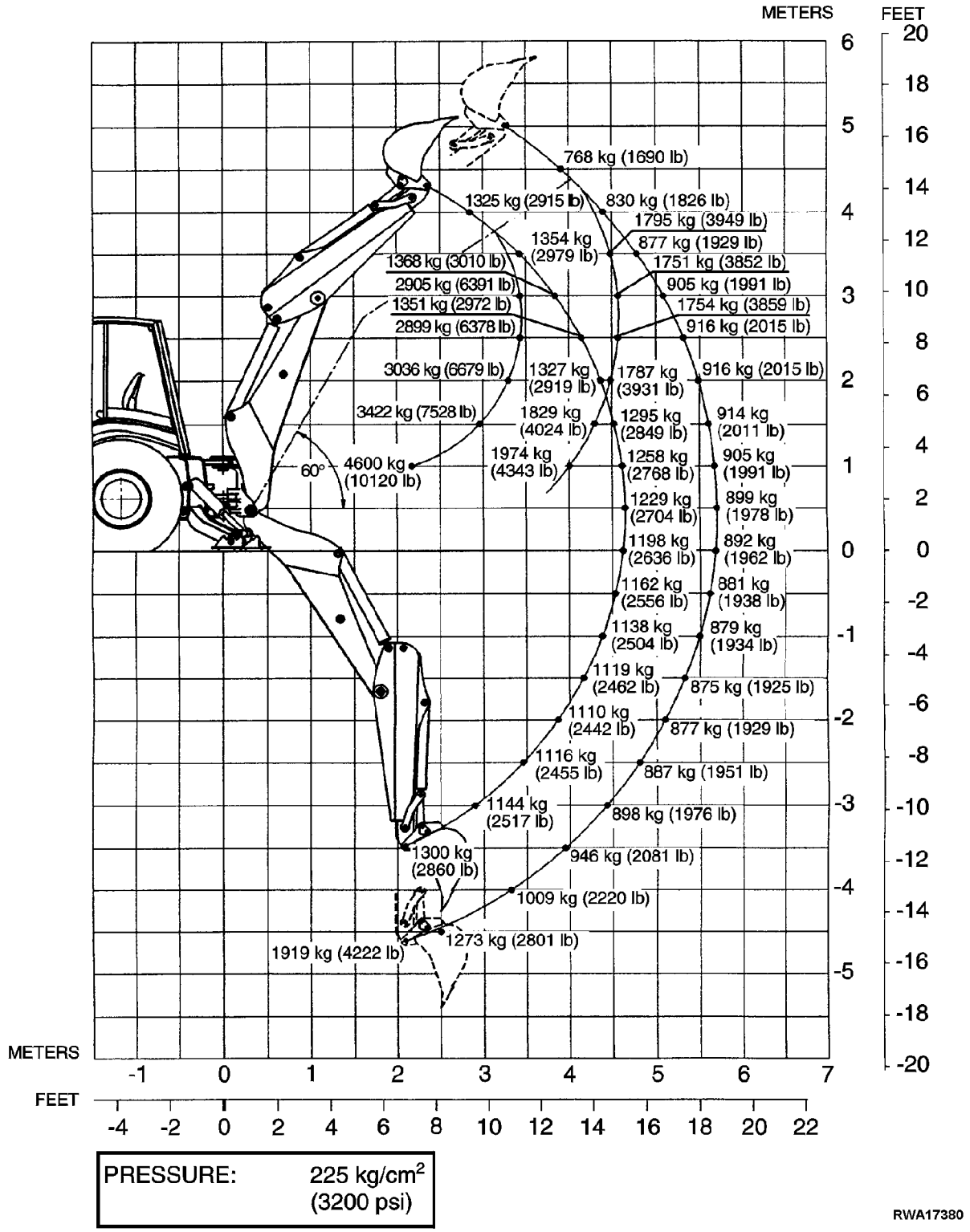

METERS
FEET
649 kg (1428 lb)
1115 kg (2453 lb)
702 kg (1544 lb)
1534 kg (3375 lb)
1139 kg (2506 lb)
741 kg (1630 lb)
1151 kg (2532 lb)
1496 kg (3291 lb)
2301 kg (5062 lb)
765 kg (1683 lb)
1137 kg (2501 lb)
1492 kg (3282 lb)
2296 kg (5051 lb)
774 kg (1703 lb)
2405 kg (5291 lb)
1117 kg (2457 lb)
1526 kg (3357 lb)
774 kg (1703 lb)
2711 kg (5964 lb)
1600 kg (3520 lb)
1090 kg (2398 lb)
773 kg (1701 lb)
3890 kg (8558 lb)
60°
1752 kg (3854 lb)
1062 kg (2336 lb)
765 kg (1683 lb)
1034 kg (2275 lb)
760 kg (1672 lb)
1008 kg (2218 lb)
754 kg (1659 lb)
981 kg (2158 lb)
745 kg (1639 lb)
961 kg (2114 lb)
743 kg (1635 lb)
945 kg (2079 lb)
740 kg (1628 lb)
937 kg (2061 lb)
741 kg (1630 lb)
942 kg (2072 lb)
750 kg (1650 lb)
966 kg (2125 lb)
759 kg (1670 lb)
1094 kg (2407 lb)
800 kg (1760 lb)
853 kg (1877 lb)
1076 kg (2367 lb)
1622 kg (3568 lb)
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
METERS
-1 0 1 2 3 4 5 6 7
FEET
-4 -2 0 2 4 6 8 10 12 14 16 18 20 22
PRESSURE: 210 kg/cm² (3000 psi)
RWA17370

LIFTING CAPACITY — WB150PS-2N



PRESSURE:	225 kg/cm^2 (3200 psi)

RWA17360



PRESSURE:	225 kg/cm^2 (3200 psi)

RWA17380

OPTIONAL ATTACHMENTS

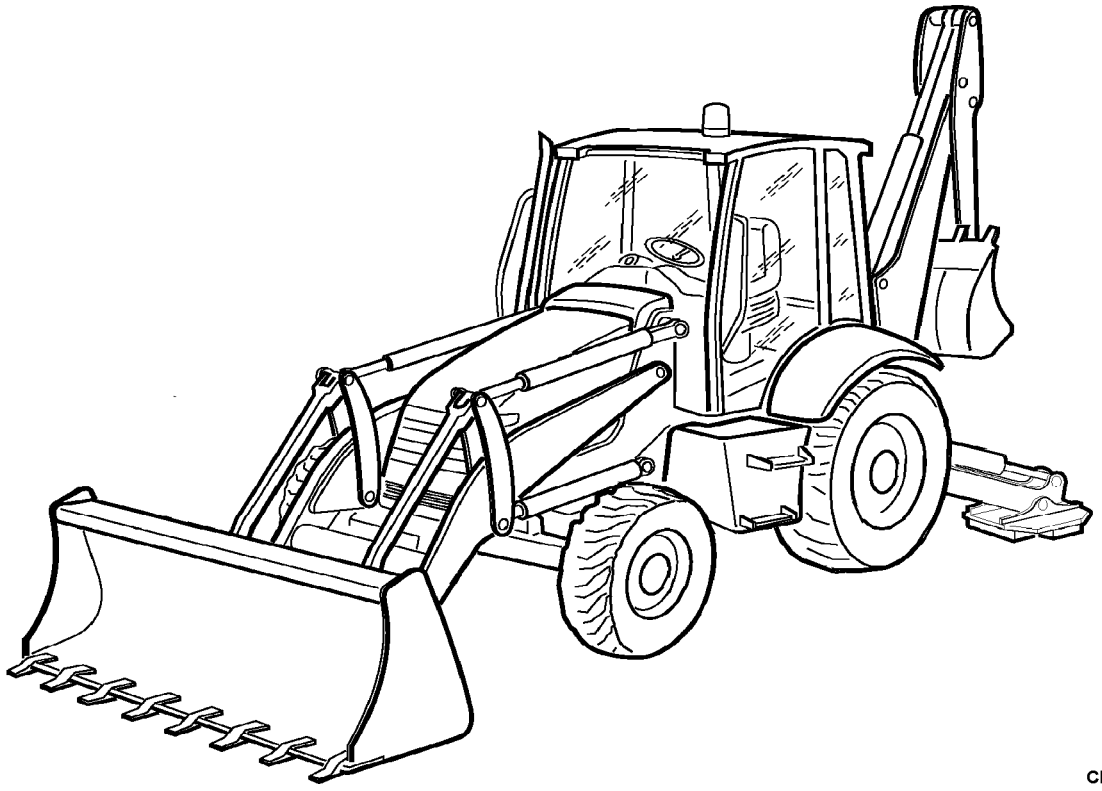
AUTHORIZED OPTIONAL EQUIPMENT

In addition to the standard equipment, Komatsu machines can be ordered with optional equipment. Read and study all operations and safety information instructions relating to the optional equipment. Failure to do so may result in equipment damage, operator injury, or both. Komatsu cannot be held liable for damage, accident, or reduced performance because of the use of unauthorized equipment. Use only authorized equipment on your machine.

BASIC PRECAUTIONS

When installing or using optional equipment, always contact your Komatsu Dealer first. Be sure the personnel installing or using the optional equipment are trained and authorized to do so. Listed are some basic safety precautions that must be observed when installing or using optional equipment:

- Install or remove the optional equipment on a firm, level surface.
- Ensure the optional equipment being installed is in good operating condition.
- When performing operations with two or more people, agree to communication signals in advance and stick to them.
- Always use an overhead crane when lifting equipment weighing more than 25 kg (55 lbs.)
- The machine's center of gravity changes when optional equipment is installed.
- Make sure the machine is rated for the optional equipment being installed.
- When using optional equipment be sure all non-authorized personnel are at least 12 m (40 ft.) away from the work area.



CNC0024

OPTIONAL EQUIPMENT MEASUREMENTS — WB140PS-2N

★ Specific weight of the material handling = 1.8 tons/cu.m

FRONT-END LOADER

Equipment	Max. Weight kg (lbs.)	Max. Dimensions		Max. SAE Capacity Cu. m (cu. yd.)	Max. Operating Pressure bar. (PSI)	Max. Flow Rate per minute
		Width mm (inch)	Height mm (inch)			
Front bucket	450 (992)	2,320 (91.4)	940 (37)	1.1 (1.44)	—	—
Multipurpose bucket	750 (1654)	2,340 (92.1)	1015 (40)	1.00 (1.30)	185 (2,682)	75 liters (19.8 GPM)
Lifting forks on bucket	190 (419)	● ●	● ●	❑ ❑	—	—
Pallet forks	320 (706)	1,800 (70.8)	800 (31.5)	❑ ❑	—	—

BACKHOE UNIT

Backhoe bucket	200 (441)	930 (36.6)	— —	0.305 (0.40)	— —	— —
Ditch-cleaning bucket	220 (485)	1600 (63)	— —	0.250 (0.33)	— —	— —
Trapezoidal bucket	190 (419)	2,100 (82.6)	900 (35.4)	0.300 (0.40)	— —	— —
Hydraulic hammer	450 (992)	— —	— —	— —	160 (2,320)	80 (21.2)
Drill	360 (794)	800❊ (31.5)❊	2,000▲ (78.7)▲	— —	200 (2900)	120 (31.7)
Clamshell bucket	350 (772)	650 (25.6)	1800 (70.8)	0.200 (0.26)	200 (2900)	120 (31.7)

● - Fork length 1,140 mm (44.9 inches)
❑ - Maximum capacity 2,000 kg (4,409 lbs.)
❊ - Measurement referenced to the tool diameter
▲ - Measurement referenced to the tool length

OPTIONAL EQUIPMENT MEASUREMENTS — WB150PS-2N

★ Specific weight of the material handling = 1.8 tons/cu.m

FRONT END LOADER

Equipment	Max. Weight kg (lbs.)	Max. Dimensions		Max. SAE Capacity Cu. m (cu. yd.)	Max. Operating Pressure bar. (PSI)	Max. Flow Rate per minute
		Width mm (inch)	Height mm (inch)			
Front bucket	450 (992)	2,320 (91.4)	940 (37)	1.1 (1.44)	—	—
Multipurpose bucket	750 (1,654)	2,340 (92.1)	1015 (40)	1.00 (1.30)	200 (2,900)	75 liters (19.8 GPM)
Lifting forks on bucket	190 (419)	● ●	● ●	❑ ❑	—	—
Pallet forks	320 (706)	1,800 (70.8)	800 (31.5)	❑ ❑	—	—

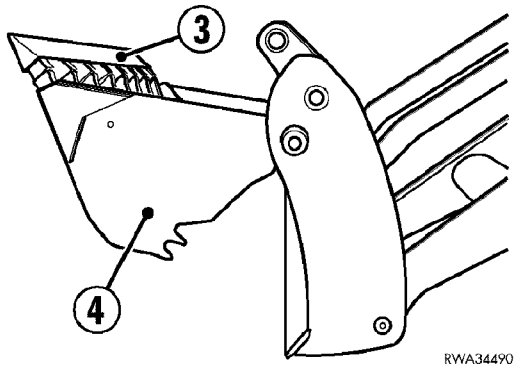
BACKHOE

Backhoe bucket	200 (441)	930 (36.6)	— —	0.305 (0.40)	— —	— —
Ditch-cleaning bucket	220 (485)	1600 (63)	— —	0.250 (0.33)	— —	— —
Trapezoidal bucket	190 (419)	2,100 (82.6)	900 (35.4)	0.300 (0.40)	— —	— —
Hydraulic hammer	450 (992)	— —	— —	— —	160 (2,320)	80 (21.2)
Drill	360 (794)	800❊ (31.5)❊	2,000▲ (78.7)▲	— —	200 (2,900)	120 (31.7)
Clamshell bucket	350 (772)	650 (25.6)	1,800 (70.8)	0.200 (0.26)	200 (2,900)	120 (31.7)

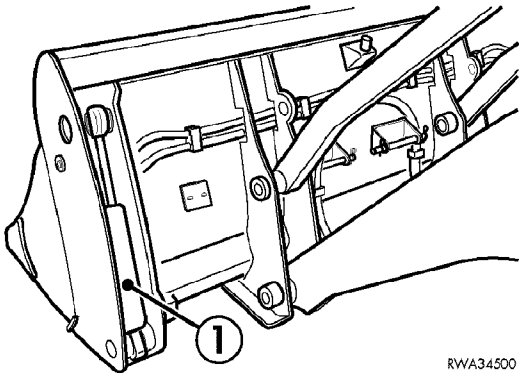
● - Fork length 1,140 mm (44.9 inches)
❑ - Maximum capacity 2,000 kg (4,409 lbs.)
❊ - Measurement referenced to the tool diameter
▲ - Measurement referenced to the tool length

MULTIPURPOSE BUCKET

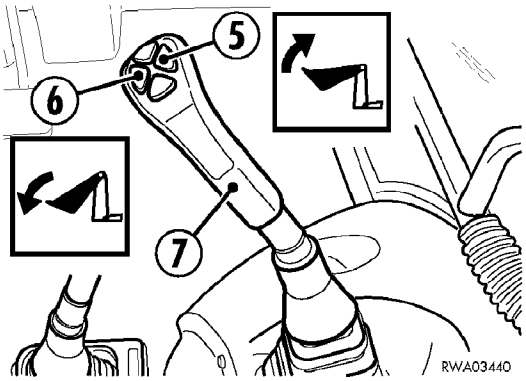
The multipurpose bucket can be used for several applications. Thus, it eliminates the need to have several different pieces and the time needed to change them. Open the bucket jaws (4) to unload material or use as a dozer blade. The multipurpose bucket is equipped with a protective teeth casing (3).



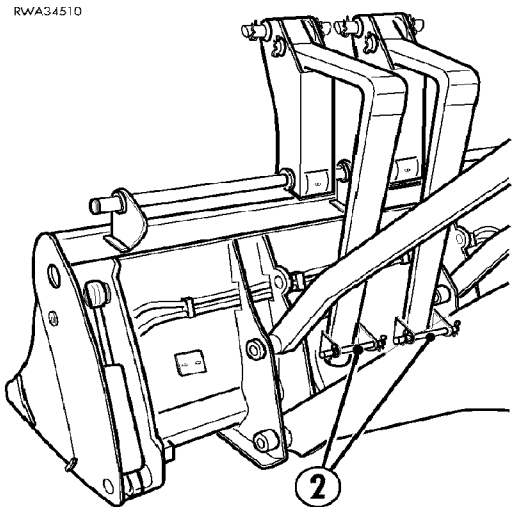
The hydraulic cylinders (1) operate the jaws opening and closing.



Press buttons (5, 6) on the loader control lever (7) to operate the bucket jaws.



A set of optional lifting forks can be installed for material handling purposes. If the multipurpose bucket is equipped with pallet forks, safety pins keep the forks in the locked position when not in use.

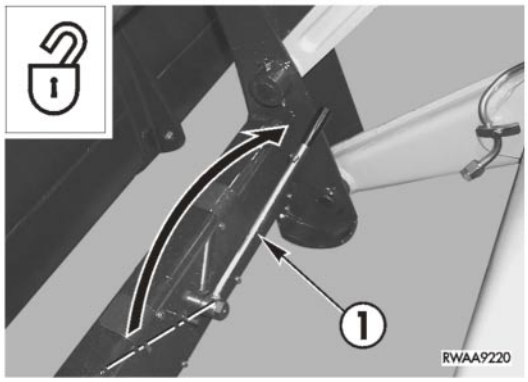


MULTIPURPOSE BUCKET COUPLING

All coupling and uncoupling operations must be performed on flat, firm surface. Before beginning work operations, ensure the equipment installed is in good working order and installed correctly. Depending on the option ordered, two methods exist for making the connections: manual and hydraulic.

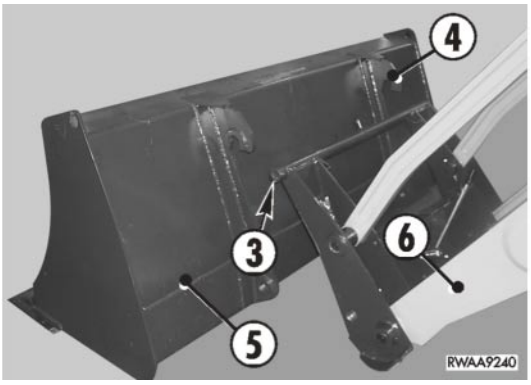
MANUAL COUPLING

1. Rotate the lock lever handle (1) to unlock the fulcrum pin.

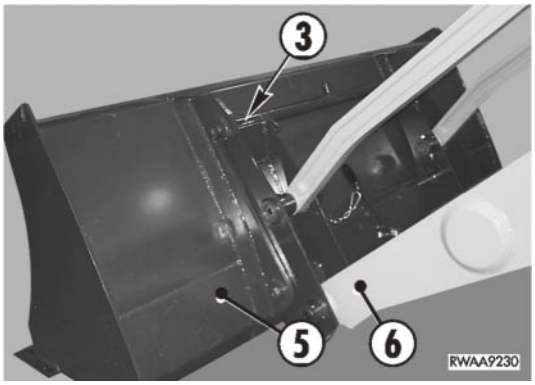


2. Position the machine so the support cradle is perpendicular to the equipment being installed.

3. Using the bucket control lever, position the fixed coupling pins (3) under the upper seats or hooks (4) of the bucket (5)

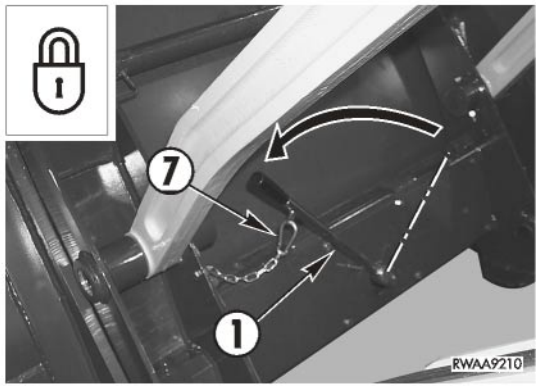


4. Raise the arm (6) to engage the pins (3) in the upper seats (4) of the bucket (5). When in place, raise the bucket slightly.



5. Rotate the lock lever handle (1) to lock the fulcrum pin
6. Hook the safety restraint (7) to the handle (1).

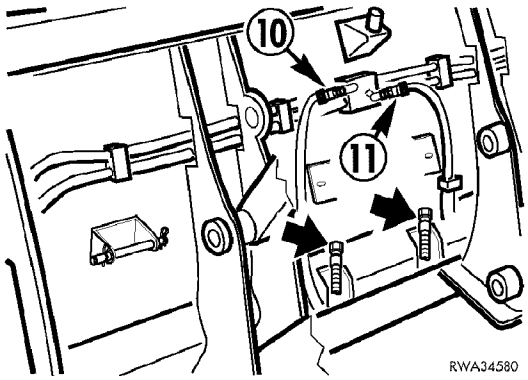
Lube all fittings after installation.



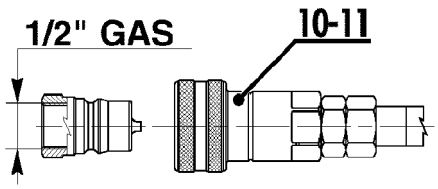
HYDRAULIC COUPLING

This method controls the fulcrum pins hydraulically instead of with a lever. With the exception of engaging the fulcrum pins, the connections are identical to the manual coupling. Other optional equipment with uni-directional flow can use this method also.

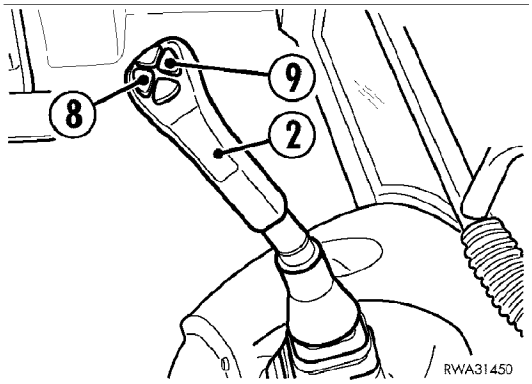
1. Connect the hydraulic lines (10, 11) with quick couplers.



Close up of the specified quick coupler (right).



To operate the fulcrum pins after making the hydraulic connections, press the buttons (8, 9) on the loader control lever (2).



MULTIPURPOSE BUCKET INSTALLATION

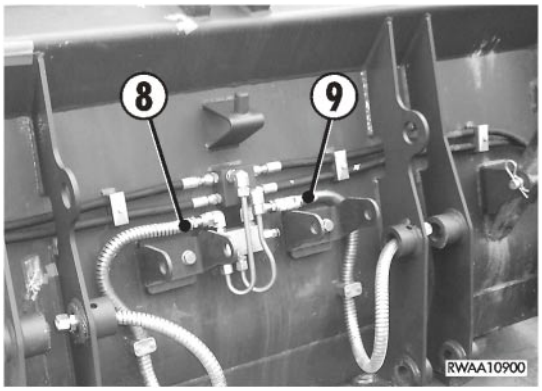
⚠ WARNING

Chips may come off when removing or installing coupling pins. Always wear goggles, gloves, and a hard hat for protection. Installing or removing the bucket requires two people. Thus, make sure both people understand the hand signals used for this operation. Use a steel drift to align the holes. Never use your fingers to align the holes or injury could result.

After coupling the loader, turn off the engine and operate the hydraulic controls in all directions several times. This step releases any residual hydraulic line pressure. Apply the parking brake.

While making the hydraulic line connections, take steps to prevent dirt from entering the lines.

1. The hydraulic piping for this option have protective plugs installed when this option is not in use. Loosen the protective plugs and remove them from the hydraulic piping.
2. Remove the protective plugs from the hydraulic hoses (8, 9).
3. Hook up the connections as indicated in the photo.
4. Start the engine and raise the bucket several centimeters (about an inch or so) off the ground. Using the buttons on the loader control lever, open and close the jaws several times to ensure that the bucket is operating.



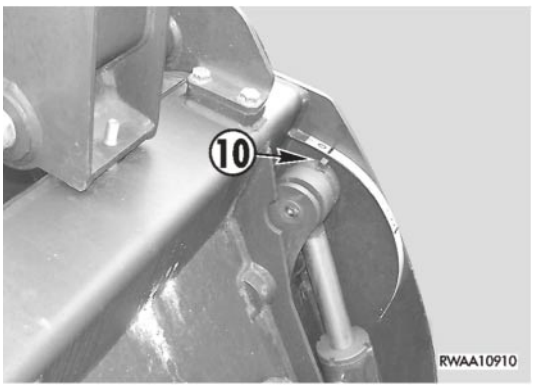
⚠ WARNING

Wear thick gloves when checking the hydraulic oil level. When checking the hydraulic lines for leaks, use a piece of cardboard.

5. Lower the bucket to the ground and stop the machine.
6. Lubricate the bucket joints.
7. Check the hydraulic oil level.

Remark

Before using the bucket, ensure that the bucket position indicator is correctly set. The bucket is equipped with an indicator (10) to show the position of the upper part of the bucket.



MULTIPURPOSE BUCKET USES

- Loading.
- Opening the bucket for vertical unloading on high surfaces instead of horizontal unloading.
- Opening and closing the jaws like pliers to handle logs, branches, etc.
- Flushing and leveling with an open bucket.

Remark

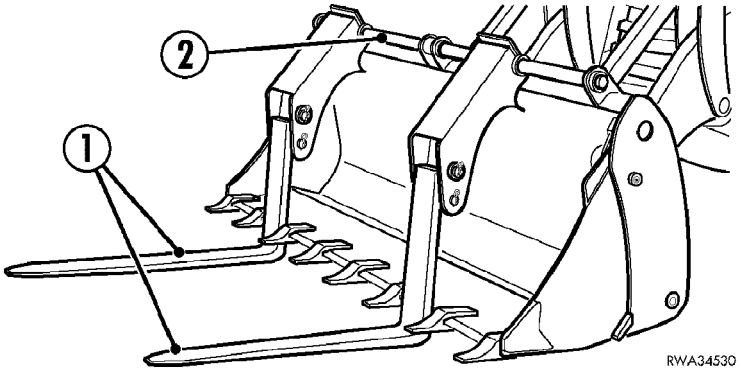
With the bucket open and positioned on the ground, move forward to flush (doze) or move backward to level (grade).

MULTIPURPOSE BUCKET WITH FORK LIFT

⚠ WARNING

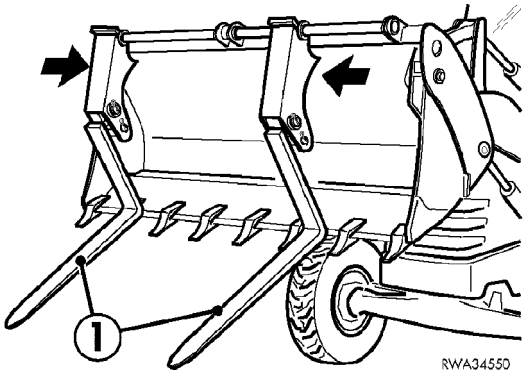
Before working with the fork lift, the operator must learn to maneuver with the forks because of the added length beyond the bucket. The operator must also learn how to operate the fork controls before using the fork lift.
Position the forks as far apart as possible for a given load to provide the greatest stability. To prevent the load from slipping sideways, position each fork between two teeth and both forks resting on the bucket blade. After positioning the forks into the load but before suspending the load, position the load to prevent it from slipping. To avoid vibrations that may cause the load to shift, operate the shift, oscillation, and lift controls slowly and smoothly.
Be careful when grasping the forks for removal or installation because your feet and hands could get cut. Have two people install or remove the forks.

The optional pallet forks are usually installed on the multipurpose bucket for handling pallets, loading and unloading various pipe. Sliding the forks on the bar (2) adjusts the distance between them.



FORK ADJUSTMENT

1. Position the forks (1) to the front of the machine.
2. Raise the bucket to clear the ground.
3. Tip the bucket forward to release the forks (1) from the bucket teeth.
4. Slide the forks (1) apart the as far apart as possible to handle the given load.
5. Tip the bucket back so the forks (1) do not rest on the tips of the bucket teeth. Position each fork (1) between two teeth.
6. Position the lifting arm so the forks (1) are horizontal.
7. Lubricate the fork rotation pins.

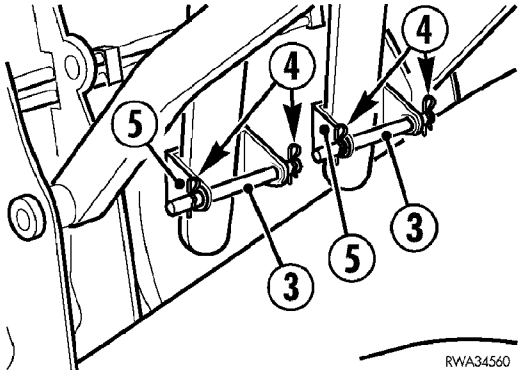


Remark

When using the forks be sure the forks are fully engaged into the load. Never carry a load with the tips of the forks. Always be aware of the extra length the forks add when maneuvering the machine.

BEFORE TRAVELING

1. Remove the safety pins (4) and then the pins (3).
2. Slide the forks to the center of the bucket.
3. Overturn the forks and insert them in the supports (5).
4. Reinstall the pins (3) and secure them with the lock pins (4).



⚠ WARNING

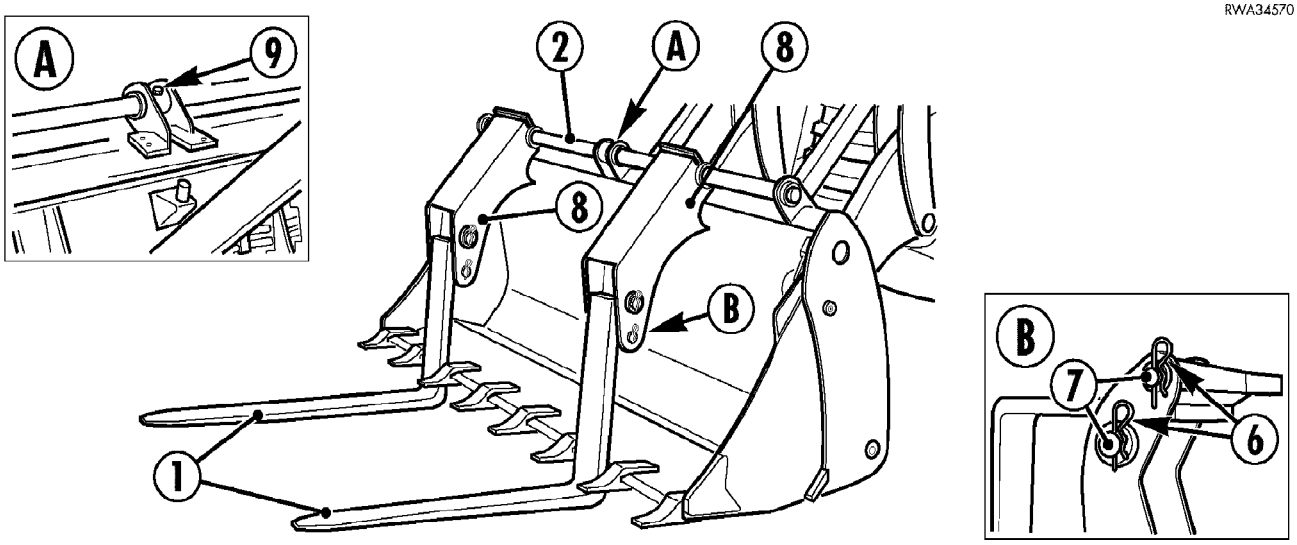
Ensure the lock pins (4) are correctly inserted.

REMOVING AND INSTALLING THE FORKS

To remove the pallet forks:

1. Rest the bucket in a horizontal position on a flat and level surface.
2. Remove the safety pins (6, 7).
3. Remove the screws (9) that hold the slide bar (2) in place.
4. While holding a support (8), withdraw the slide bar (2). Repeat the same operation for the remaining support.

RWA34570



To install the forks, perform the procedure in reverse order.

⚠ WARNING

Always ware gloves and face shield when wen removing or installing the forks or any other optional equipment.

BACKHOE TELESCOPIC ARM

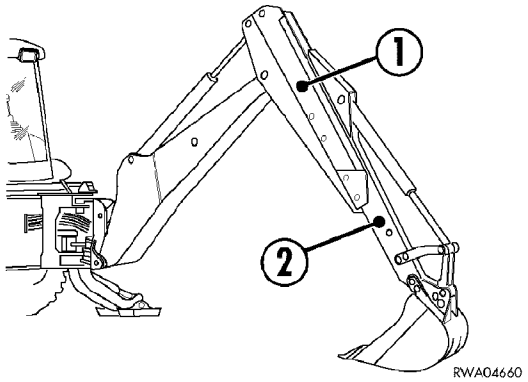
⚠ WARNING

Before releasing and extending the arm, ensure that the stabilizers rest on firm ground. If possible, unload the material as close to the machine as possible. Working with the backhoe misaligned makes the machine unstable and cause it to tip over. Thus, operate the arm slowly when swinging it to unload the material when working with a misaligned backhoe.

Using the optional telescoping arm extends the reach of the backhoe arm. This situation makes it possible to perform operations outside of the normal backhoe radius. However, using the telescopic arm reduces the breakout force, which means the backhoe must lift lighter loads.

DESCRIPTION AND CONTROL

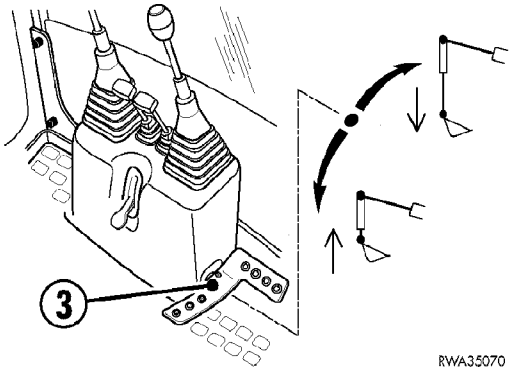
The telescopic arm has an external hollow arm (1), which the inner arm (2) slides through on a V-shaped guides. This arm extends or retracts hydraulically.



A pedal (3) controls the telescopic arm movement. Pressing the front of the pedal extends the arm. Pressing the rear of the pedal retracts the arm.

Remark

An extended arm reduces the breakout force of the backhoe when lifting loads.

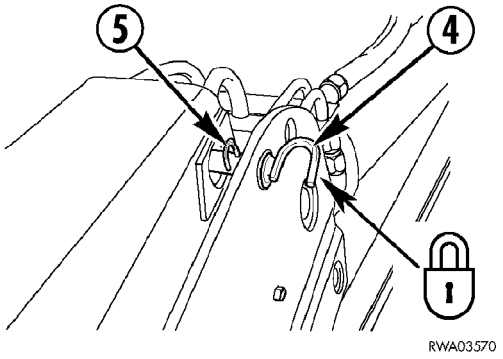


SAFETY LOCKS

When traveling or operating the front end loader, insert the safety clip (4) into the telescopic arm. Secure the clip (4) with the pin (5).

When using a hammer, compactor, or similar attachments contact your Komatsu dealer prior to using any attachment with the telescopic arm.

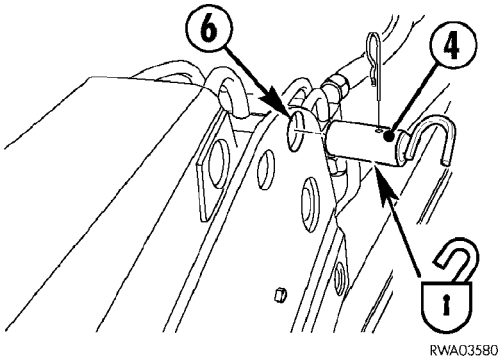
To install the safety lock, retract the arm fully, remove the pin and clip from its holding place and insert it into the holes cut in the arm boss.



When the backhoe is in use and the telescoping arm is needed, remove the pin (4) and insert it into the holding place (6) for the pin

Remark

Always keep the safety pin with the machine. Never use a substitute or damaged pin. If it is missing or damaged have it replaced immediately.



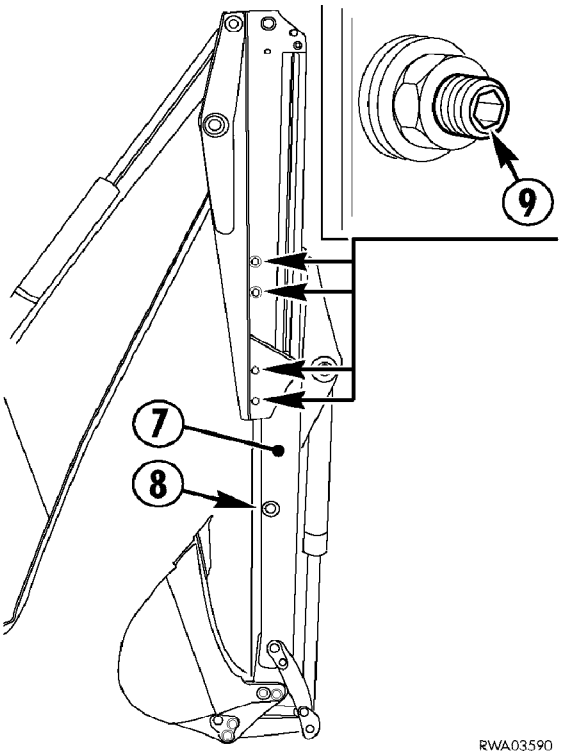
MAINTENANCE

The telescopic arm requires two maintenance procedures:

- Lubrication of joints (grease fittings) See "LUBRICATION DIAGRAMS" on page 3-18.
- Adjust the slide guide (8) free play when impacts or vibrations are detected during work.

⚠ WARNING

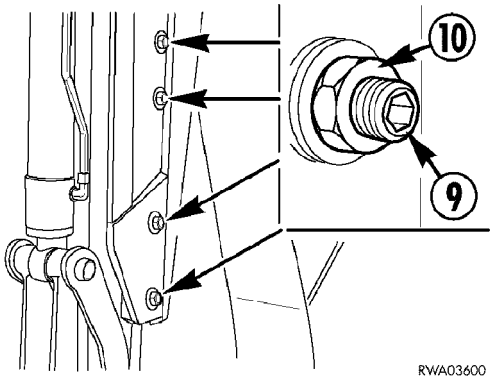
Before leaving the operators compartment to adjust the guides, remove the ignition key and tag the steering wheel. Adjust the screws and guides one at a time. Do not place tools in the space between the safety locks and the arm.



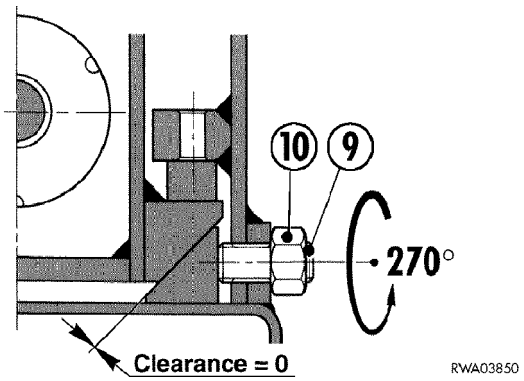
1. Position the machine on a flat, firm surface and lower both outriggers.
2. Raise the boom, fold the bucket, and fully extend the telescopic arm (7).
3. Fold the arm until the slide guides (8) are perpendicular to the ground and positioned so that the extendable part is completely free and does not strain the guides.
4. Stop the engine.
5. Determine which side has the guide adjusting dowels (9) protruding the most. Make the adjustments only on the side that the dowels protrude the most.

Remark

If the adjusting dowels (9) protrude the same amount from both sides, the adjustment can be done on either the right or left side.

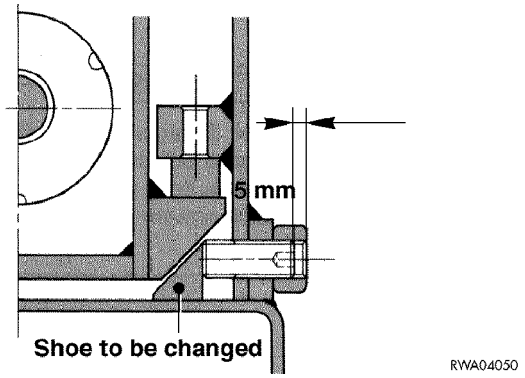


6. Loosen the four locknuts (10).
7. Tighten the four adjusting dowels (9) until all free play is eliminated.
8. Starting from the central position, loosen the adjusting dowels (9) 270° (3 to 4 turns).
9. Tighten the locknuts (10).
10. Start the machine.
11. Extend and retract the telescopic arm several times to make sure it slides freely.
12. Lubricate all lubrication points on the telescopic arm.
13. Extend and retract the arm one more time to spread the lubricant onto the slides.



Remark

Replace the shoes when the heads of the dowels (9) are recessed 5 mm (0.2 in.) inside the locknuts (10). To prevent the guides from seizing, do not remove all free play.

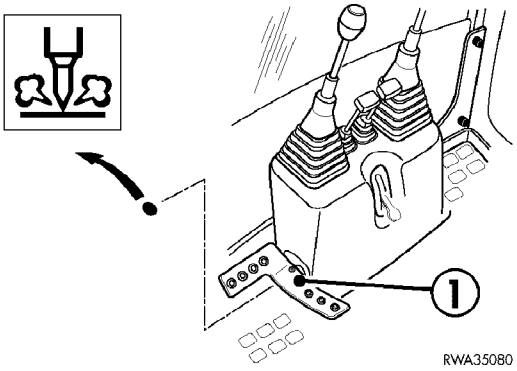


DEMOLITION HAMMER

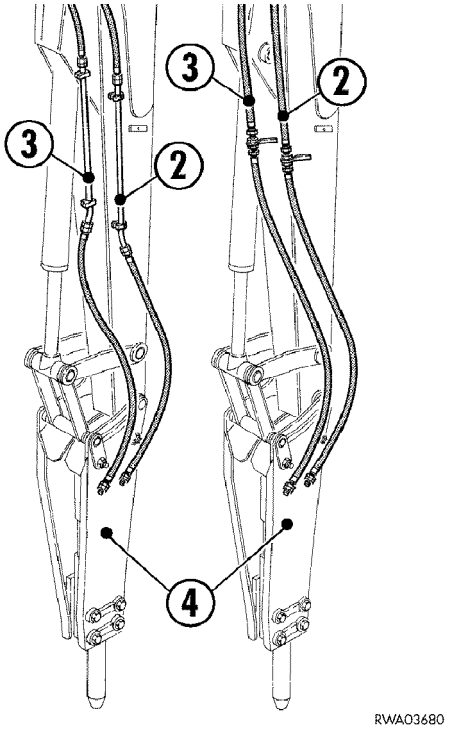
The machine can be fitted with a demolition hammer on the backhoe. Use this hammer for breaking up concrete, asphalt, or rocks. The materials to be broken and the type of work to be performed dictates the tool geometry.

DESCRIPTION AND CONTROL

A pedal (1) on the left side of the backhoe control levers controls the hammer. Pressing the front of the pedal activates the hammer while pressing the back of the pedal deactivates the hammer.



The arrangement includes the fixed connection of the hydraulic delivery line (2) and return line (3) with the hammer (4)



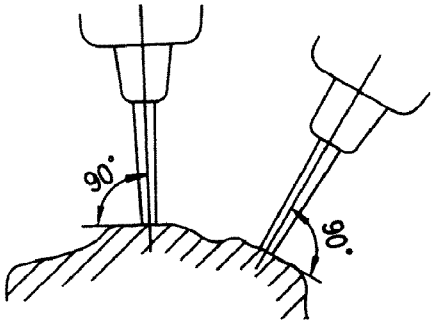
HAMMER USAGE RULES

⚠ WARNING

When using the hammer attachment, always wear eye and hearing protection. Never allow anyone to stand near you while using the hammer.

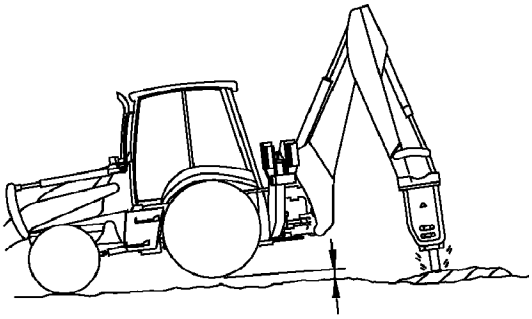
For correct usage, it is necessary to:

1. Make sure the hammer angle is correct with respect to the material to be broken. Ensure the hammer is as perpendicular as possible and the arm thrust is sufficient. That way full power of the hammer can be used.



RWA06410

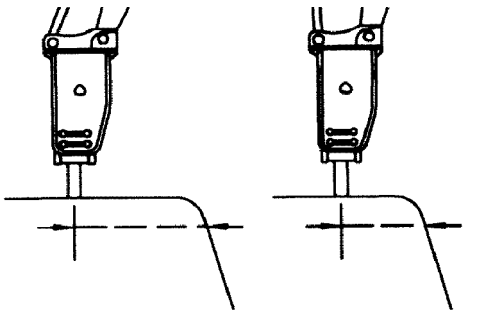
2. As the hammer penetrates the material, raise the wheels about 5 cm (2 in.) off the ground to keep constant pressure on the hammer. Be careful not to swing or move the machine when performing this operation.


RWA29210

3. When working on very hard materials, do not to keep hitting the same point for more than 30 seconds. Hit the same point a few seconds and then change the hammer position frequently to facilitate the breaking process.

Remark

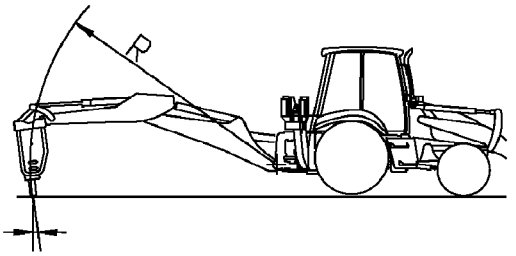
The power in the backhoe is the breakout feature when using this tool. Do not use the backhoe to reposition or swing the machine to the left or right. Doing so will damage the swing cylinders or possibly tip the machine over.


RWA06430

4. To facilitate the sliding of the tool on its seat, check the thrust direction and always correct the hitting position of the hammer by using the bucket and arm control.

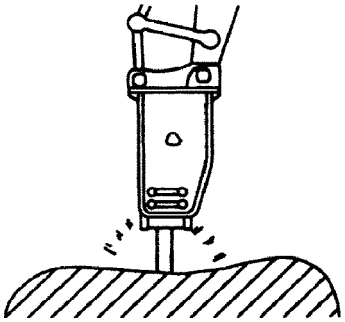
Remark

Do not use the demolition hammer with the bucket cylinder at the end of its stroke. Always leave a minimum space of 5 cm (2 in.)



RWA29220

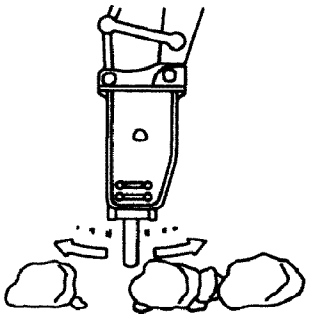
5. Always be sure the arm at its optimal position to avoid harmful or useless strokes.



RWA06450

ALWAYS AVOID THE FOLLOWING

Gathering or moving materials with the demolition hammer.

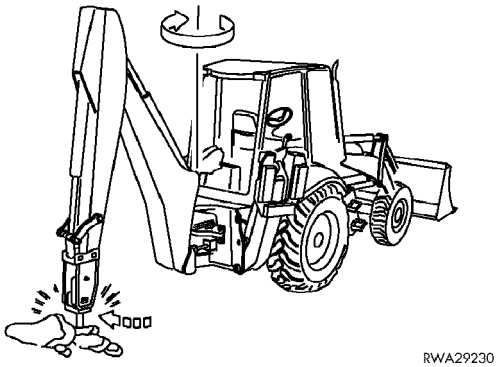


RWA06460

Rotating the boom while using the hammer

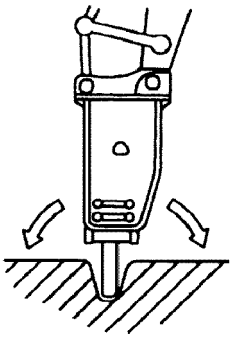
Remark

Remember the power in the backhoe is the breakout feature when using this tool. Do not use the backhoe to reposition or swing the machine to the left or right. Doing so will damage the swing cylinders or possibly tip the machine over.



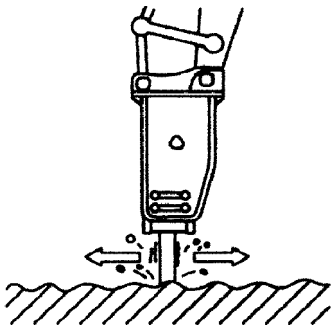
RWA29230

Using the tool as a pry bar between the broken material.



RWA06500

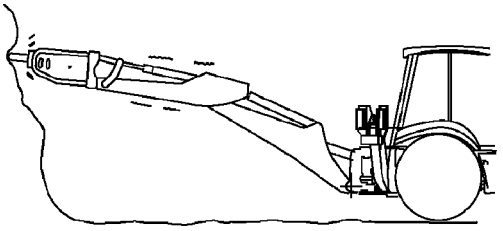
Moving the tool back and forth while breaking the material.



RWA06480

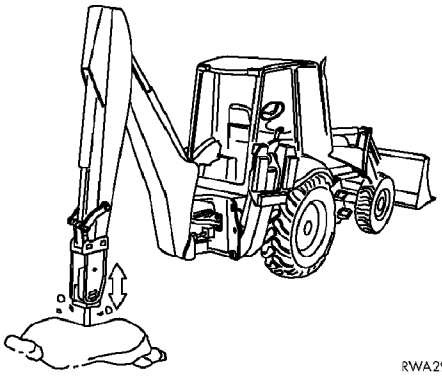
ALWAYS AVOID THE FOLLOWING

Working with the hammer in a horizontal position or even with the greater inclination of the machine.



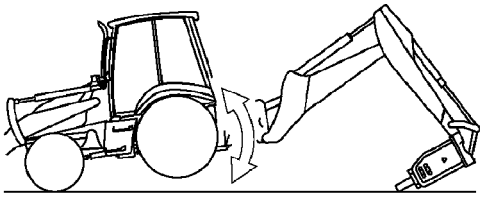
RWA29240

Striking the ground with the hammer bit.



RWA29250

Lifting the machine with the demolition hammer.



RWA29260

DEMOLITION HAMMER INSTALLATION AND REMOVAL

⚠ WARNING

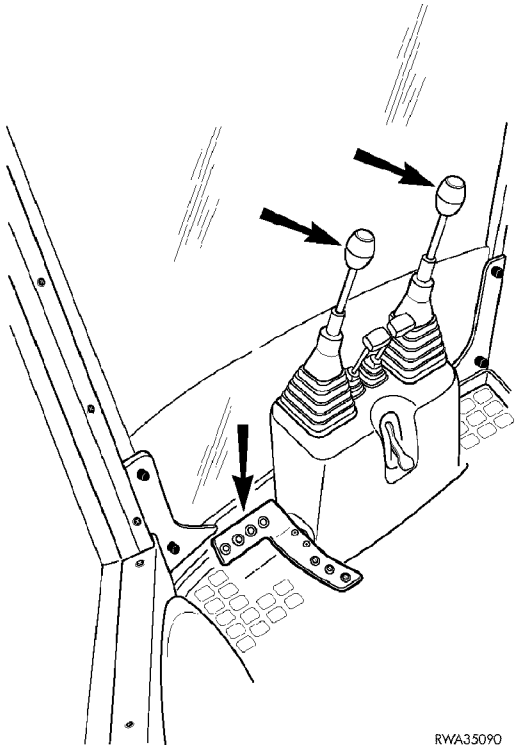
When removing or installing the hammer, always wear eye and hand protection. Before performing removal or installation, relieve all hydraulic pressure.

INSTALLATION

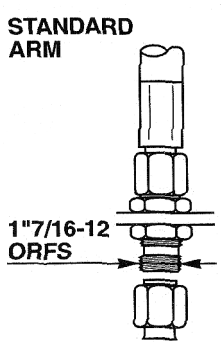
The demolition hammer installation requires the mechanical constraints of the backhoe bucket: See "CHANGING THE BACKHOE BUCKET" on page 2-54.

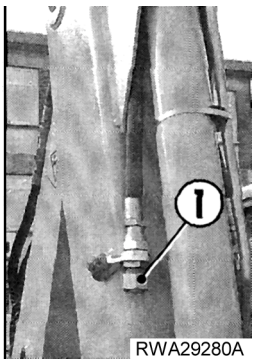
To make the hydraulic connections:

1. Stop the engine.
2. Neutralize all hydraulic controls to relieve hydraulic pressure in the system.
3. Press the hammer control pedal to release the hydraulic pressure within the hydraulic lines of the hammer.



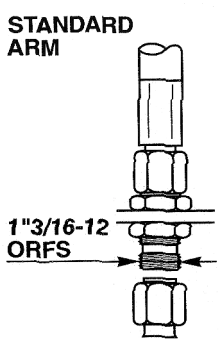
4. Remove the cap plugs from the hydraulic piping and hoses. Use a 32, 36, 38 and 41 mm wrench.
5. Connect the right coupling (1) and then the left coupling (2). Ensure the connections all match.
6. Be careful not to get impurities between the couplings when installing them.
7. After tightening the connections, start the engine.
8. Raise the hammer, positioning it vertically.
9. Stop the engine and lubricate all points on the hammer.
10. Before starting work operations, check for hydraulic leaks.

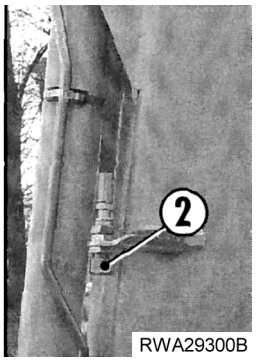


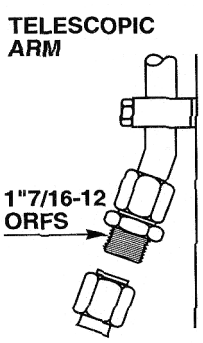


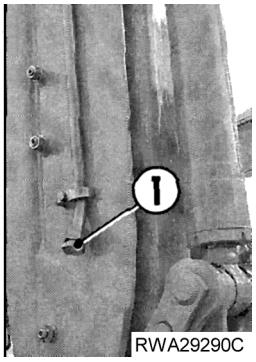
WARNING

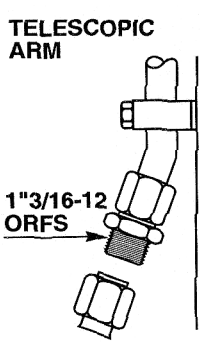
Always wear thick gloves and safety goggles when checking the hydraulic circuit for leaks. Wear thick gloves while using a piece of cardboard to check for leaks.

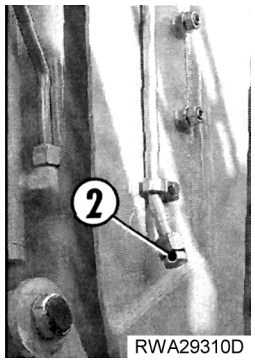












REMOVAL

To remove the hammer:

1. Stop the engine.
2. Neutralize all the hydraulic controls to relieve the hydraulic pressure in those hydraulic circuits.
3. Press the hammer control pedal to release the hydraulic pressure in the hammer hydraulic circuit.
4. Disconnect the hammer delivery and return lines, capping them immediately.
5. Disconnect the hammer from the constraints. See “CHANGING THE BACKHOE BUCKET” on page 2-54.
6. Operate the controls and check for hydraulic leaks around the caps.

WARNING

Always wear thick gloves and safety goggles when checking the hydraulic circuit for leaks. Wear thick gloves while using a piece of cardboard to check for leaks.

CLAMSHELL BUCKET

The machine can be arranged for the installation of a clamshell bucket on the backhoe instead of the standard digging bucket. The clamshell bucket picks up material instead of scooping it with a digging bucket.

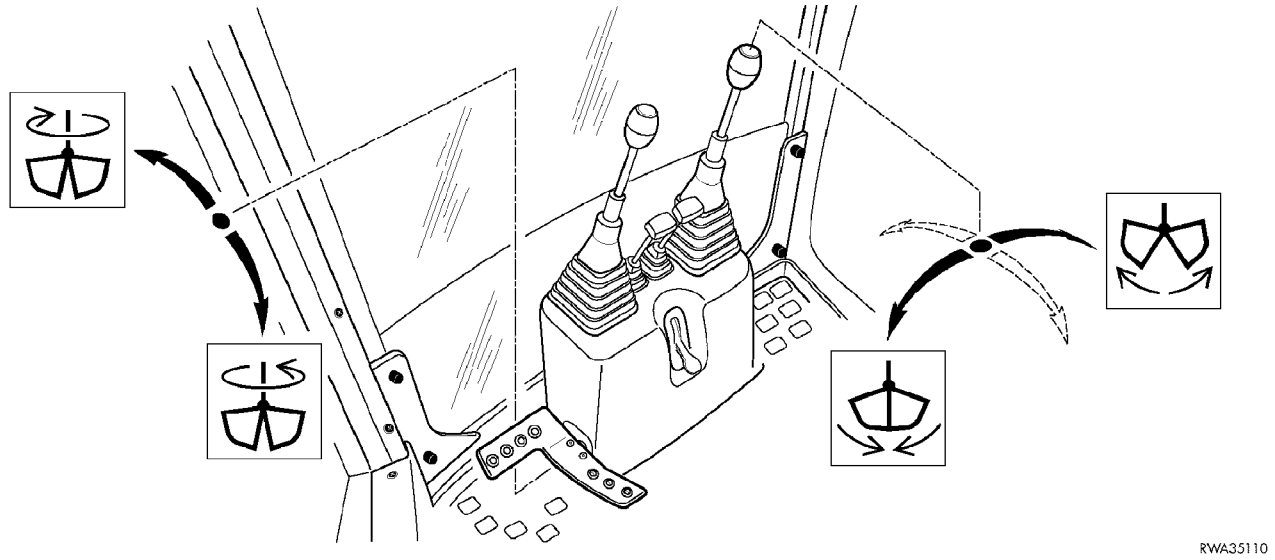
⚠ WARNING

If the machine is equipped with a clamshell bucket, do not travel on the roads. That is because of the clamshell's size and that it swings from the arm when traveling. Thus, install the clamshell bucket at the work site and remove the clamshell bucket before travelling on the roads.

DESCRIPTION AND CONTROL

An additional distributor and standard backhoe hydraulic circuit controls are used. The standard backhoe hydraulic circuit controls the clamshell opening and closing. The additional distributor controls the clamshell bucket swing movement:

- Pressing the front end of the pedal causes the bucket to rotate clockwise.
- Pressing the back end of the pedal causes the bucket to rotate counterclockwise.



CLAMSHELL BUCKET INSTALLATION

⚠ WARNING

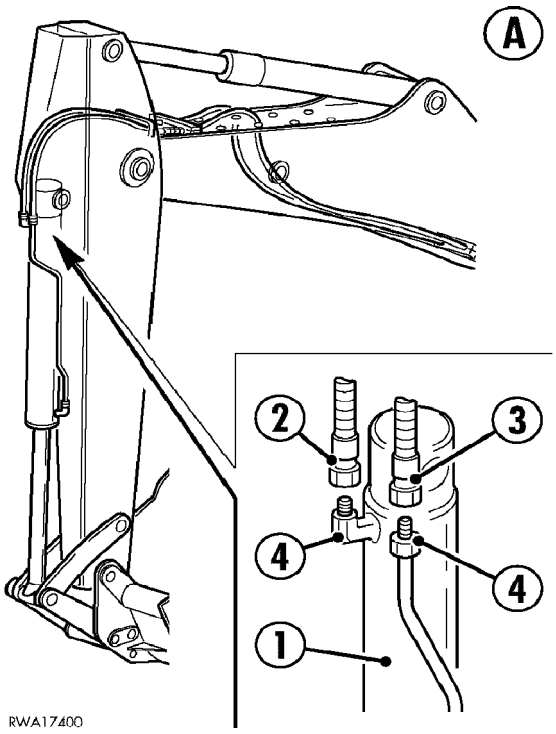
When removing or installing the clamshell bucket, always wear eye and hand protection.
Use a steel drift to align the holes. Never ever use your fingers to align the holes.
Release the hydraulic pressure before installing or removing equipment. Shift the controls several times with the system off. And slowly loosen the hydraulic fill cap to release pressure within the tank.
To install or remove the clamshell bucket requires two people. Perform all work on a flat, smooth surface.

To perform the installation procedures:

1. Remove the standard bucket from the backhoe.
2. Retract the digging bucket cylinder ram completely.
3. Install the clamshell bucket to the arm.
4. Stop the machine and neutralize all the hydraulic controls.
5. Lock the bucket ram in place at the end of its stroke.
6. The remaining steps depend on if a standard arm is used or a telescopic arm.

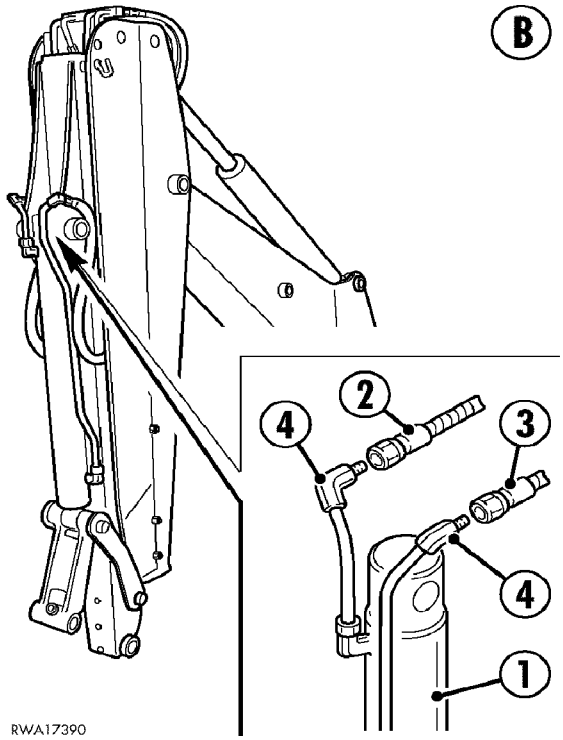
STANDARD ARM

1. In figure (A) disconnect the supply lines (2, 3) that operate the bucket cylinder (1). Seal the couplings (4).



TELESCOPIC ARM

1. In figure (B) disconnect the supply lines (2, 3) that operate the bucket cylinder (1). Seal the couplings (4).
2. Connect the supply lines from the standard bucket cylinder to the lines controlling the clamshell bucket.
3. Be sure all unused lines are capped and sealed. be careful when installing lines. Ensure that dirt or debris does not get trapped in these couplings.
4. Start the machine and raise the clamshell off the ground.
5. Open and close and then swing the bucket several times.



CLAMSHELL BUCKET REMOVAL

To remove the clamshell bucket, reverse the installation order.

OPERATING THE CLAMSHELL BUCKET

Consult the specific operators manual for the clamshell bucket.

HYDRAULIC JACK HAMMER

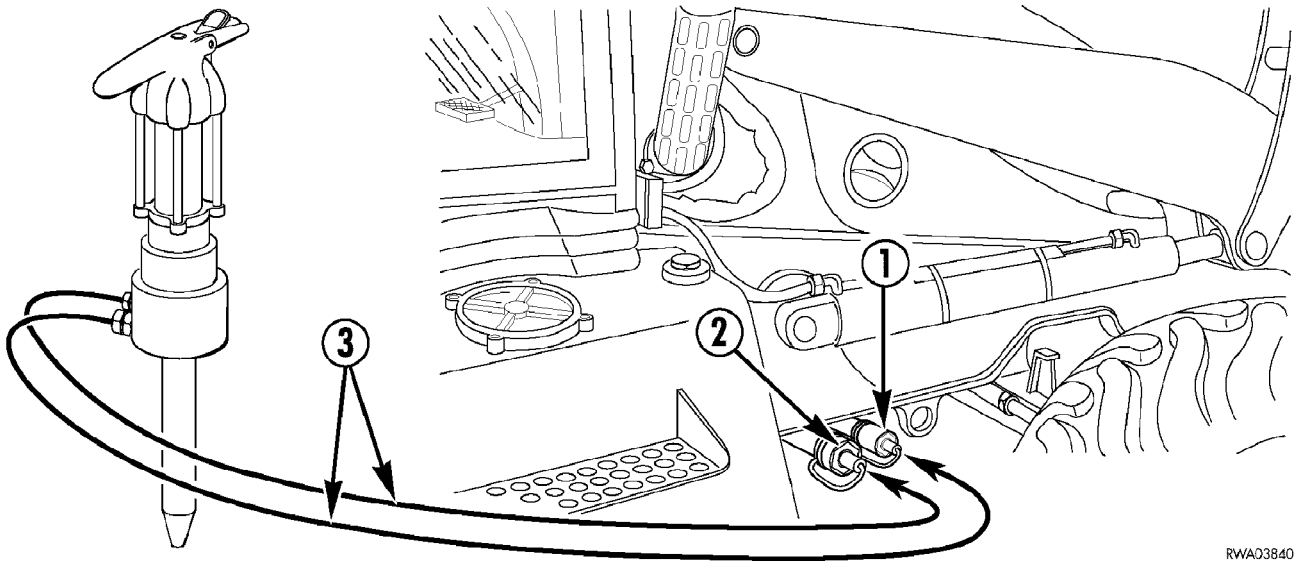
⚠ WARNING

The hydraulic jack hammer is very noisy. Thus, always wear ear protection to prevent hearing loss.
The manual jack hammer transmits intense vibrations that may cause physical stress. Therefore, take short rests periodically, especially when the upper limbs become tired. And because of fatigue, be careful at the end of the work day.

Because the machine may be equipped with off-tractor hydraulics, a jack hammer or similar approved tool may be used. This option eliminates the need for an independent power source when using some power tools.

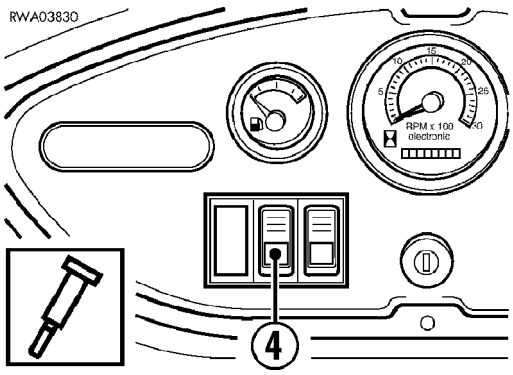
DESCRIPTION AND CONTROL

The machine can be provided with the delivery (1) and return (2) couplings for the use of a manual hydraulic jack hammer. The connection to the machine is made up of two flexible lines (3).



The switch (4) is on the dashboard. Pressing the switch once engages the system and the switch glows. Pressing the switch a second time disengages the system and the lighted switch turns off.

For jack hammer operation, see the manual provided with the tool.



CONNECTING THE JACK HAMMER

⚠ WARNING

Perform the hammer connection and removal of the with machine in the parked position, parking brake set, and all safety locks engaged.

To connect the hammer:
1. Stop the engine.
2. Neutralize all hydraulic controls to relieve hydraulic pressure from the system.
3. Turn ignition switch to the “I” position
4. Press switch (4) to release any residual pressure from the hammer.
5. Ensure couplings are clean and free from dirt or debris. Carefully install the couplings.
6. Turn the switch (4) off
7. Start the engine.
8. Engage the switch (4) again
9. Increase the engine RPM as specified in the tool operation manual.

DISCONNECTING THE JACK HAMMER

To disconnect the hammer:
1. Press button (4) to disengage solenoid and shut the hydraulics down.
2. Stop engine and neutralize all hydraulic controls to relieve any pressure on the system.
3. Turn ignition switch to the “I” position.
4. Press the switch (4) to release any residual pressure from the hammer.
5. Press the switch (4) again to turn the system off.
6. Disconnect the tool
7. Cap all connection openings.

USING THE JACK HAMMER

For operation of jack hammer, see manual provided with the tool.

OPTIONAL EQUIPMENT WITH UNIDIRECTIONAL OIL FLOW

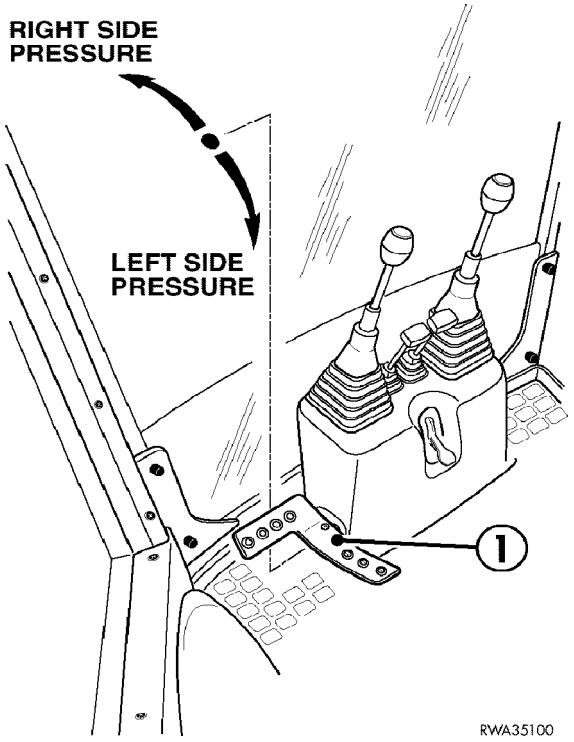
⚠ WARNING

When certain optional equipment is installed on the machine, it cannot be driven on any roads. Check with local authorities if in doubt. A machine that cannot be driven on the roads requires the optional equipment attached at the work site. The equipment must be once again removed before travelling on the road.

Optional equipment can be installed on the backhoe in place of the standard bucket. A pedal (1) to the left of the backhoe levers controls the hydraulic circuit from the additional hydraulic distributor.

- Pressing the front part of the pedal delivers hydraulic oil to the right side of the circuit. The oil returns through the left side.
- Pressing the rear part of the pedal delivers hydraulic oil to the left side of the circuit. The oil returns through the right side.

The function of the backhoe levers remains unchanged, except for the bucket movement. What once controlled the bucket position now controls the optional equipment position.



INSTALLING AND CONNECTING THE EQUIPMENT

⚠ WARNING

While making the hydraulic connections, prevent dirt or other foreign objects from entering the hydraulic lines. Check the hydraulic system for leaks with a piece of cardboard, and wear thick gloves and goggles.

See “CHANGING THE BACKHOE BUCKET” on page 2-54 to install the equipment.

1. After connecting the equipment, stop the machine.
2. Press the pedal (1) forward and backward several times to release any residual hydraulic pressure.
3. Remove the plugs in the two pipes and of the installed equipment.
4. Connect the delivery and return pipes.
5. Start the machine.
6. Perform several maneuvers that require the pedal (1) to be pressed forward and backwards.
7. Stop the machine.
8. If needed, fasten the longer pipes to avoid vibrations.

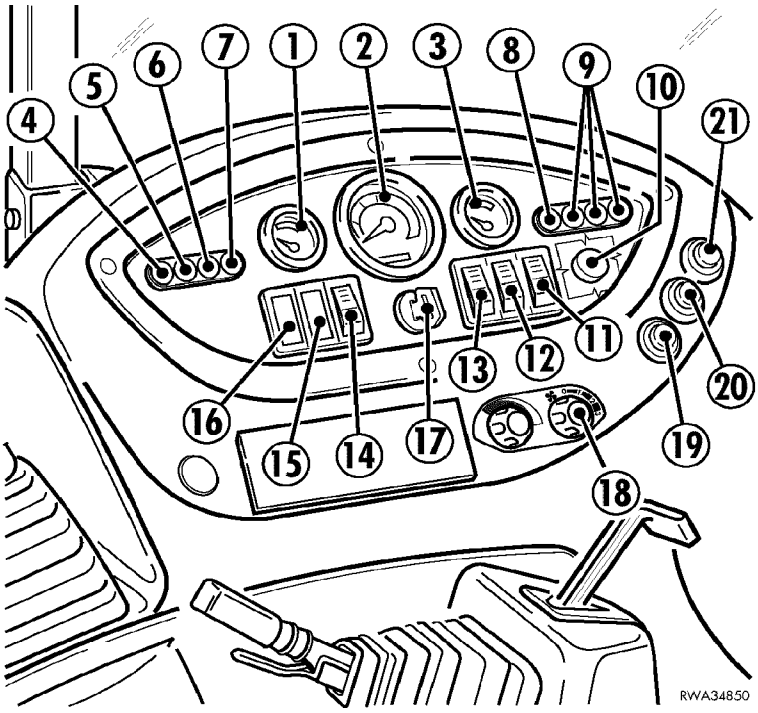
LOAD STABILIZER SYSTEM (LSS)

⚠ WARNING

Never operate the LSS while using the backhoe.

The load stabilizer system (LSS) reduces oscillations while travelling on any type terrain, regardless if the bucket is full or empty. This feature reduces operator fatigue while increasing productivity and lessening impacts to the machine.

With the LSS operating, the weight of the arms and bucket limit loader pressure in low position. While the machine is travelling, the weight of the bucket is cushioned hydraulically. Press the switch (15) and it glows to indicate the LSS is operating.



Remark

Always turn off the electric safety valves before operating the LSS.

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