CEAM009402

Operation & Maintenance Manual

WB140-2N
WB150-2N

BACKHOE LOADER

SERIAL NUMBERS	WB140-2N	A20001	and UP
	WB150-2N	A60001	and UP

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

Due to this continuous program of research and development, periodic revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

January 2003

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 (WB140-2N)	BEPB020801
Chassis and Engine (WB150-2N)	BEPB021300
OPERATION AND MAINTENANCE MANUAL:	
Chassis and Engine	CEAM009402
SHOP MANUAL	
Chassis	CEBM009800
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.

REQUISITION FOR TECHNICAL SERVICE PUBLICATIONS AND SERVICE FORMS

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440 North Fairway Drive
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IMPORTANT - TO ASSURE SHIPMENT OF THE CORRECT PUBLICATION(S), THE MODEL NUMBER AND MACHINE SERIAL NUMBER MUST BE SHOWN.

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

CURRENT PRICES WILL BE CHARGED

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).
- SNOWPLOWING (ANGLE DOZER BLADE - SNOWPLOW).
- DEMOLITION (HAND HAMER - HAMMER ON BACKHOE UNIT).
- DITCH CLEANING AND DIGGING (SPECIAL BUCKETS).

NON-APPROVED

This paragraph describes some of the improper or unauthorized uses of the machine; since it is impossible to predict all the possible improper uses, if the machine happens to be used for any particular application other than those approved above, it is important to contact your Authorized Komatsu Dealer before carrying out the work operations.

- USE OF MACHINE FOR LIFTING OR TRANSPORTING PERSONNEL IN ANY MANNOR.
- TRANSPORTATION OF FLAMMABLE LIQUIDS.
- LIFTING, MOVING OR TRANSPORTING OTHER MACHINES WITH THE FRONT END LOADER OR BACKHOE UNIT.
- TOWING OTHER EQUIPMENT WITH THE TRACTOR UNIT 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. A new machine must be operated carefully for the first 100 hours in order to ensure proper running-in time for the various components. It the machine is subjected to excessive or sever work loads at the beginning of it's operation, it's functions will be greatly reduced or damaged. Every new machine must be used carefully, pay special attention to the following indications:

- 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, carry out the following maintenance, in addition to normal maintenance performed at 250 hours perform:
  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 TYPES

SYNTHETIC BIODEGRADABLE OIL TYPES

On machines in which synthetic biodegradable types of oils are used, the following operations are to be performed besides the standard maintenance operations:

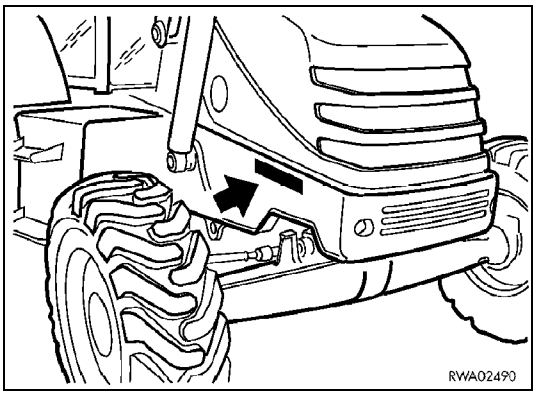
- After the first 50 hours of operation, change the hydraulic system filter.
- After the first 500 hours of operation, change the hydraulic system oil and filter.

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. It is a good idea to record this information in this manual on page 0-9 (Serial Number and Dealer Information). All views indicated below are viewed from the operators position.

MACHINE SERIAL NUMBER

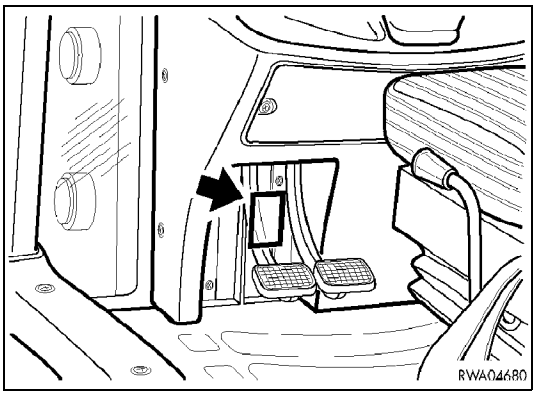
The machine serial number is stamped on the right side of the front part of the main tractor frame.



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	

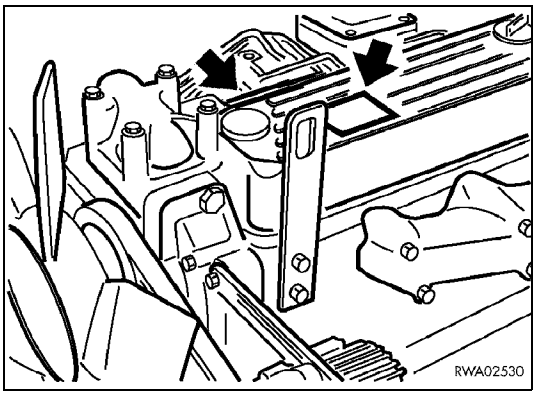
KOMATSU AMERICA INTERNATIONAL CO.

2938-98-1140

ENGINE SERIAL NUMBER AND EMISSION LABEL

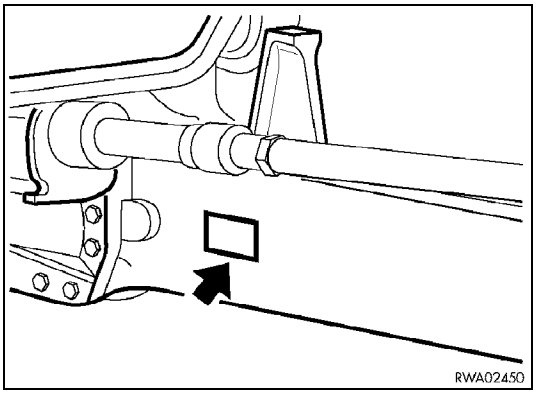
The engine serial number is stamped on a plate located on top of the engine valve cover.

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



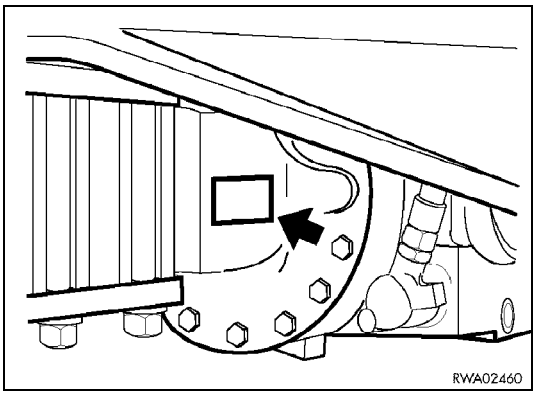
FRONT AXLE SERIAL NUMBER

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



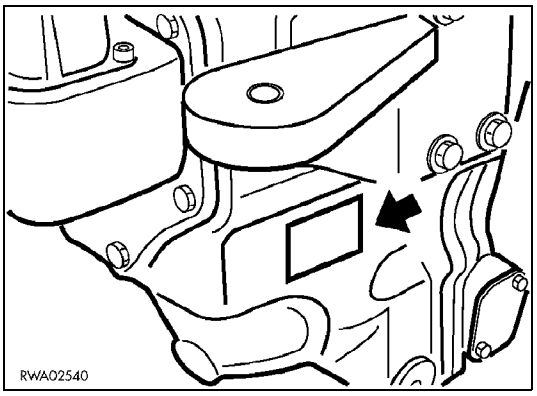
REAR AXLE SERIAL NUMBER

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



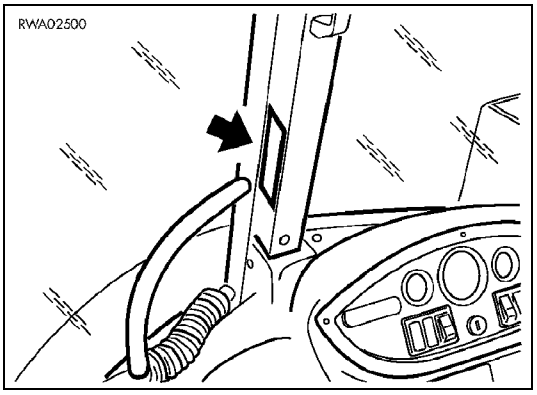
TRANSMISSION SERIAL NUMBER

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



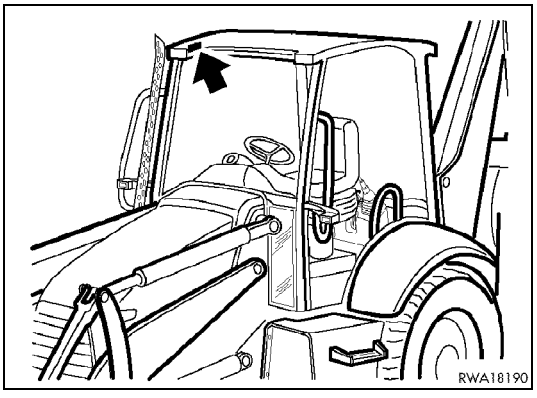
CAB SERIAL NUMBER

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: WB140-2N / WB150-2N

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

Dealer:

Address:

Phone #

Contacts:

NOTES:

CONTENTS

INTRODUCTION

SAFETY

OPERATION

MAINTENANCE

SPECIFICATIONS

OPTIONAL ATTACHMENTS

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 pre-operational 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, with the seat belt fastened snugly around their waist before 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 themachine. Never allow anyone to stand near the machine while in operation. Remember, the larger the machine the more restricted your visibility will be.

If pedestrians are in the area proceed slowly and sound your horn. Keep in mind, pedestrians have the right away, and a loaded or smaller machine has the right away over an unloaded 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, or during traffic control, be sure all personnel involved understand all hand signals that are to be used.When leaving a job site for long periods of time always lower all work equipment to the ground, neutralize work equipment controls and lock and secure your machine properly to avoid tampering by other personnel.

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 acknowledge your approach.

Follow all rules relating to safety as outlined in this manual and by your company, never get involved in horseplay.

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 WORK OPERATIONS” on page 1-8.

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 2-50.

Seat belt: See “INSIDE OPERATOR’S COMPARTMENT” on page 1-7.

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.

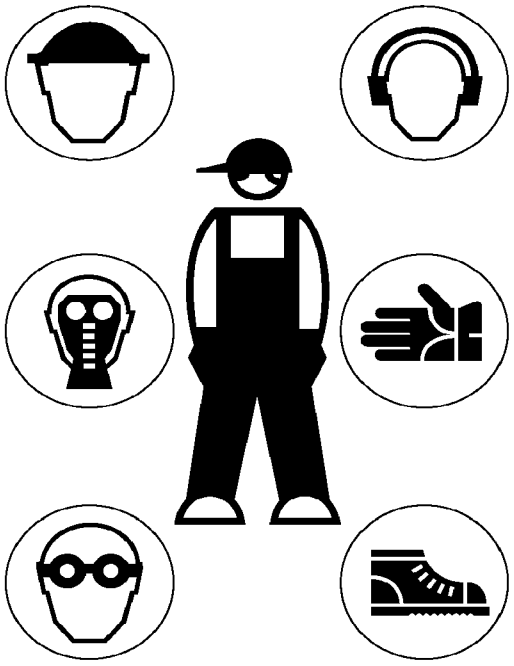
Avoid loose fitting clothing, jewelry and loose long hair. These can catch on controls or in moving parts and cause serious injury.

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

Always wear safety goggles, hard hat and heavy gloves, if your job involves 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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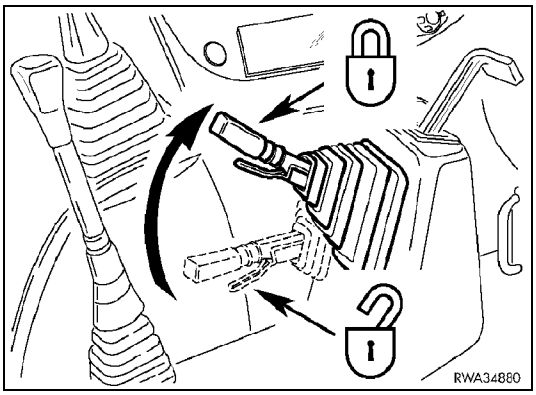
UNAUTHORIZED MODIFICATIONS

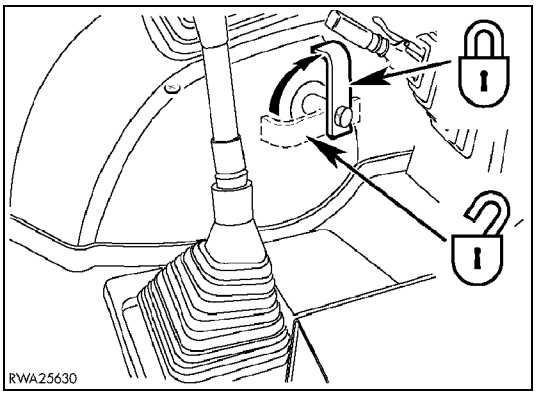
Any modification made without authorization from Komatsu can create a hazards. Before making any modifications, consult your local distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modifications.

LEAVING OPERATOR'S COMPARTMENT

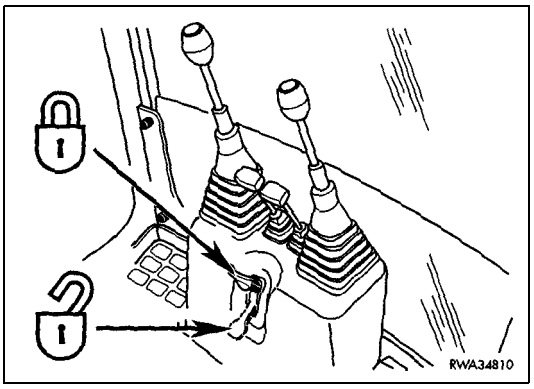
Below are listed procedures that must be followed when exiting the operator's cab.



1. Park the machine in a level area, lower all work equipment to the ground.
2. Engage the parking brake.
3. Place safety lock lever for loader control in the (**LOCKED**) position.



4. Place safety lock lever for backhoe controls in the (**LOCKED**) position.



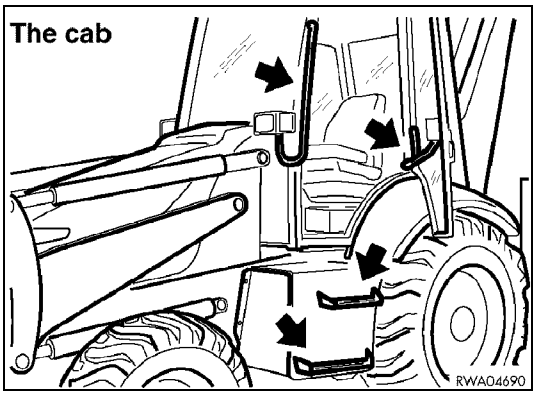
5. Remove ignition key and keep the key with you.
6. Use the key to lock and secure all the equipment locks. This will prevent other unauthorized personnel from tampering with your machine. Keep in mind you are responsible for securing your machine.

Remark

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

Work equipment posture: See "PARKING THE MACHINE" on page 2-50.
Lock:See "SAFETY LOCK USAGE" on page 2-44.

MOUNTING AND DISMOUNTING



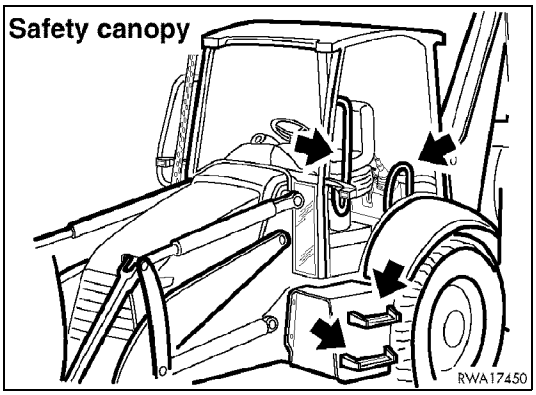
Use all hand holds and step plates on your machine.

Never jump off or on to the machine.

Before getting on the machine, if there is any oil, grease, or mud on your shoes, rails, steps or platforms, wipe it off immediately, always keep these areas clean, and in good condition.

Never get on or off 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.



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

When getting on or off the machine, always face the machine and maintain a **Three Point Contact** (both feet and one hand or one foot and both hands) with the handrails, steps and platforms to ensure that you support yourself properly.

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FIRE PREVENTION FOR FUEL AND OIL

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

- Keep any open 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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DUST HAZARD PRECAUTIONS

Dust can be hazardous to your health if it is inhaled. Komatsu does not use asbestos in its products, but if you handle materials containing asbestos fibers or other dust materials during demolition operations, always do as follows.

- Never use compressed air for cleaning.
- Use water to keep down the dust when cleaning.
- 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.
- There may be a danger that non genuine parts may contain asbestos, use only genuine Komatsu parts.
- Always observe rules and regulations related to the job site and working environment.


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RWA01010

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.

Keep in mind, when the work equipment is operated, the clearance will change, this may lead to serious personal injury or death.

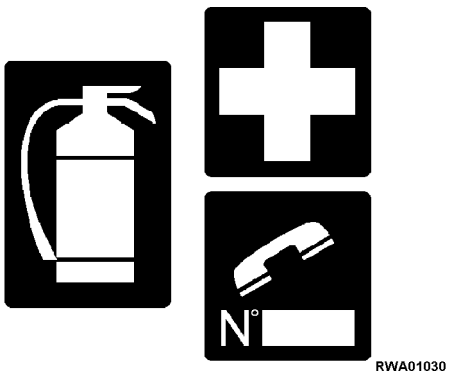
Never drive up to any one standing in front of a solid object or your path of travel. The brakes could fail or the machine could slide on a slippery surface causing injury or even death.


RWA01020

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 fire extinguisher is in good condition and read the label on it to ensure you know how to use it.
- 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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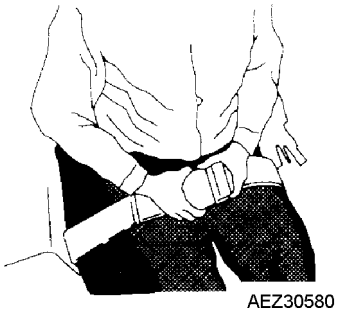
INSIDE OPERATOR'S COMPARTMENT

When 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.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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 lighters or aerosol cans lying around the operator's compartment. If the temperature inside the operator's compartment get's too high, there is danger that the lighter may explode.

Do not stick suction pads to the window glass. Suction pads may act as a lens and could cause 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 use the radio or music headphones 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 or beyond the protection of the ROPS.

Always use the seat belt equipped with your machine. Even when using the loader or backhoe unit. Be sure the seat belt is fastened snugly around your waist before operating the machine.

PRECAUTIONS WHEN USING ROPS

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. It is designed not only to support the load if the machine should roll over, but also to absorb the impact of the energy.

The ROPS fulfills all the regulations and standards for all countries, but if it is modified without authorization or is damaged, the strength may be reduced and it may not able to fulfill its function properly.

PRECAUTIONS FOR ATTACHMENTS

When installing and using an optional attachment, read the instruction manual for the attachment and information related to the attachments.

Do not use attachments that are not authorized by your Komatsu Distributor. Use of unauthorized attachments could create a safety problem and adversely affect proper operation and useful life of the machine.

Any injuries, accidents, product failures resulting from use of unauthorized attachments will not be the responsibility of Komatsu.

PRECAUTIONS BEFORE STARTING WORK OPERATIONS

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

PRE-OPERATIONAL CHECKS

Before starting your machine and preceding 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 Pre-operational Check, have them repaired immediately. Never operate a machine that is unsafe, damaged or in need of repair.

PERFORM A WALK AROUND CHECK OF YOUR 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, look for worn or leaking fittings, cut, scuffed or cracked hose surfaces. If any hose is found to be worn, cracked or leaking have it repaired or replaced immediately.

D. Check for leaking or damaged hydraulic cylinders. If any cylinder is damaged or leaking have it repaired 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 that is found and have the 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 or have the engine cleaned.

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 in operating condition.

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.

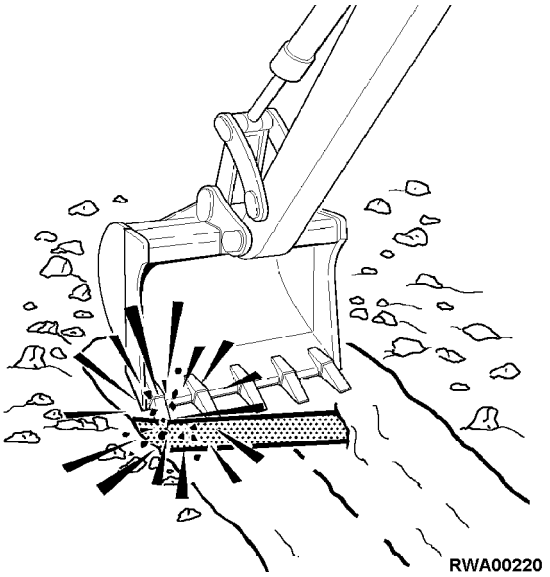
Remark

It is important that a pre-operational check be performed at the beginning of your work shift, even if you are taking the machine operations over from another operator, always perform a pre-operational check before you start work.

STARTING YOUR 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 SITE HAZARDS

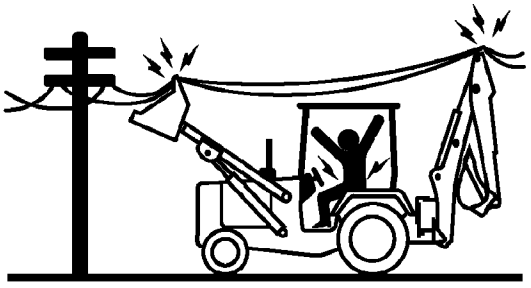


Before proceeding with any excavating operations it is important to be aware of the hazards involved with this operation. Below is a list outlining what to do to avoid some of these hazards.

- 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, sewer lines, etc.).
- Check your work area for any unusual ground conditions.
- Make sure your work area is as level as possible and you will be able to maneuver your work equipment or machine easily.
- If you will be working near a high traffic area, (pedestrians or cars) have a dedicated worker available to direct traffic or install safety fencing around your work site.
- Always be aware of all your work site dangers or distractions.

WORKING CLEARANCES

It is always a good idea to be aware of your clearances around, in front, behind and especially above your work area or travel rout.



Because of the additional height posed by the backhoe boom 1m (3 ft.) is added above the canopy that cannot be seen by the operator when the machine is in the travel posture. Some basic safety precautions to prevent risk are:

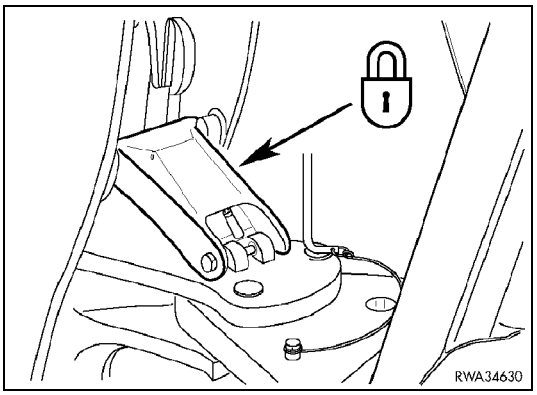
- When working or traveling in an area where clearances are a problem, travel at a slow cautious speed.
- If you are not sure of your clearances, request the aid of another person who can guide or warn you if you get too close to objects.
- Be aware of the dangers when working around overhead electrical lines, high humidity may pose an electrical hazard even if your machine clears the overhead power lines.
- If your machine should come in contact with overhead electrical lines, stop the machine and remain on the machine until the power company clears the lines and it is safe to get off or move the machine.
- If low power lines pose a greater 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.

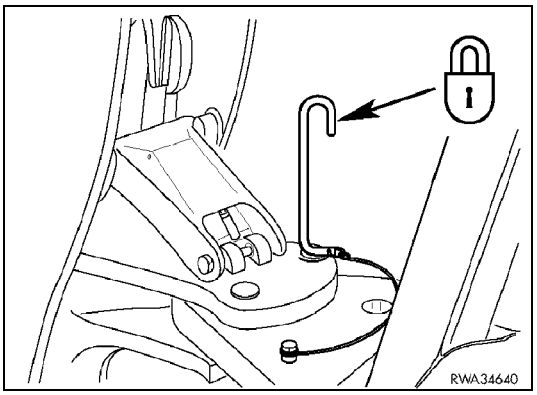
RULES FOR ROAD TRAVEL

The machine is equipped with multifunction safety locks that must be used both for maintenance operations and road travel. When necessary to travel on roads, proceed as follows:

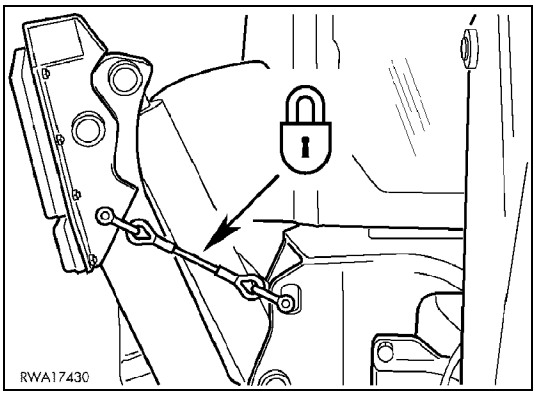
1. Raise the backhoe boom and engage the safety coupling for the arm, boom and bucket.



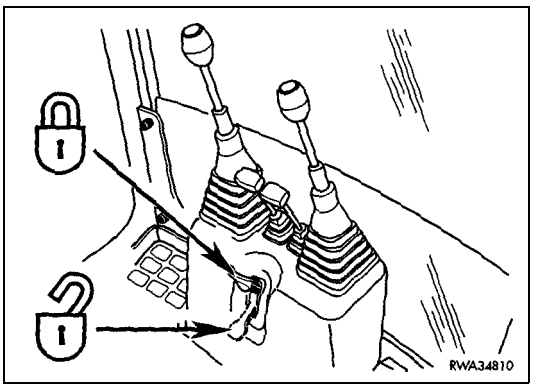
2. Center the boom and install the lock pin.



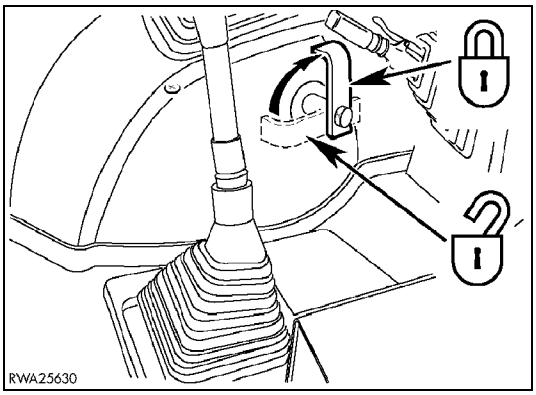
3. Connect the safety cables to prevent accidental lowering of the outriggers.



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

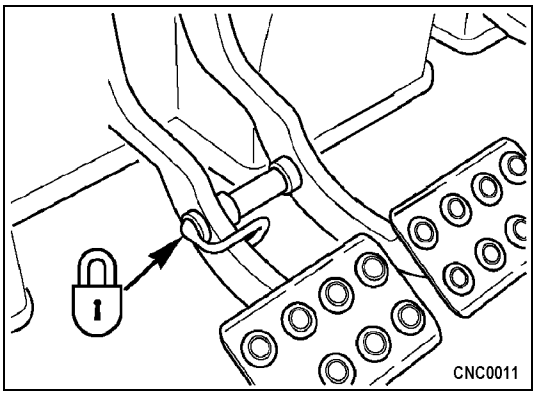


5. Raise the loader bucket to a safe travel height of 30-40 cm (12 to 16 in) from the ground, lock the loader control levers using the safety lock equipped with the machine.



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.



RULES FOR 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 you machines mirrors, keep in mind there are blind spot when using the mirrors.

TRAVELING ON ICY OR SNOW-COVERED SURFACES

If the ground is icy or covered with snow, the response of the machine to the movements of the steering wheel may not be as precise as expected. To limit the risk resulting from reduced maneuverability, proceed as follows:

- Engage the four-wheel drive system. Remember, the four-wheel drive system will not effect your braking.
- Travel at a slow safe speed. Avoid rapped accelerations or breaking.
- Remember your stopping distances are reduced during slippery conditions.

WORKING ON LOOSE OR UNSTABLE GROUND

To limit the risk when working in these areas:

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

PRECAUTIONS DURING MAINTENANCE OPERATIONS

All maintenance performed on this machine must only be performed by trained and authorized personnel. When performing 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.

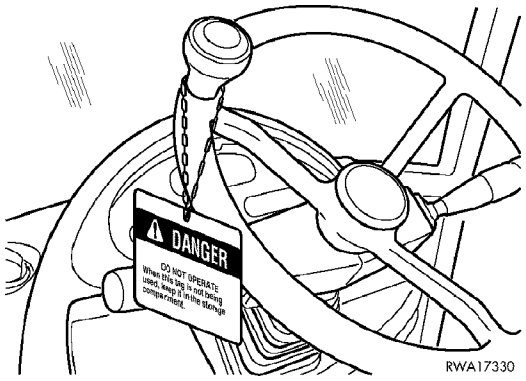
WARNING TAGS

Before performing any maintenance operations on this machine, position the machine on 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.



RWA17330

EQUIPMENT STORAGE

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

Store equipment in such a way that it cannot fall or cause injury to others.


RWA01320

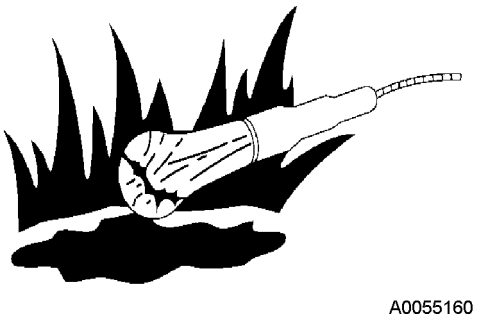
WORKING UNDER THE MACHINE

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



Use only approved anti-explosion proof lamps when checking fuel, oil, or the batteries. Non-approved lamps can cause an explosion or fire.

KEEPING THE MACHINE CLEAN

Never use flammable liquids to clean your machine. Use only approved non-flammable 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.

RUNNING THE MACHINE DURING MAINTENANCE

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

RULES FOR REFUELING THE MACHINE


RWA00980

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

Be sure you are adding the correct fluids to the proper location. Mixing fluids can cause damage to internal components.

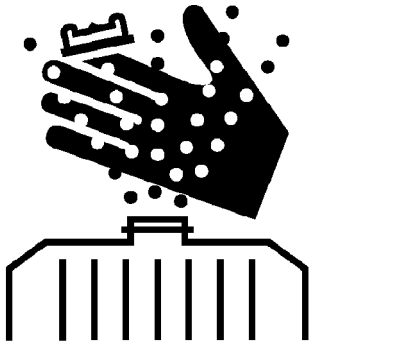
When refueling or adding any fluids, be sure you are in a well ventilate-darea.

Never smoke or allow open flames near you while you are refueling the-machine.

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

Do not fill the fuel tank completely, leave room for the fuel to expand.

COOLING SYSTEM PRECAUTIONS

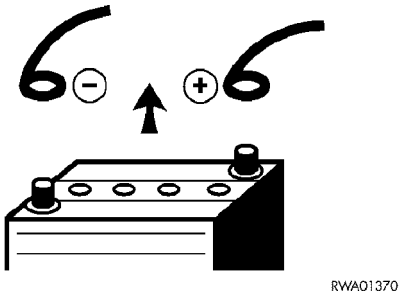

RWA01340

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

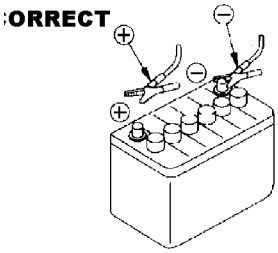
Never dump used coolant on the ground, in a lake, stream or in a sewer system. EPA Law requires these fluids to be captured and recycled prop-erly. Failure to do so is in violation of the law.

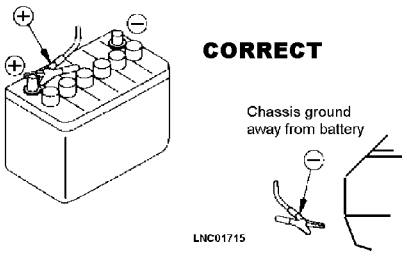
BATTERY PRECAUTIONS

When working on the electrical system, disconnect the negative (-)battery cable first then the positive (+) battery cable last.
On completion of work, reconnect the positive (+) cable first then the negative (-) cable last.


RWA01370

When using jumper cables to start the machine as shown below, hook the positive (+) jumper up first, then the negative (-) jumper last to a remote location on the chassis.





STARTING THE MACHINE

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

Always start the machine seated in the operators cab using the ignition switch.
See “BASIC TROUBLESHOOTING” on page 2-56.


RWA04890

HIGH PRESSURE HOSES

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

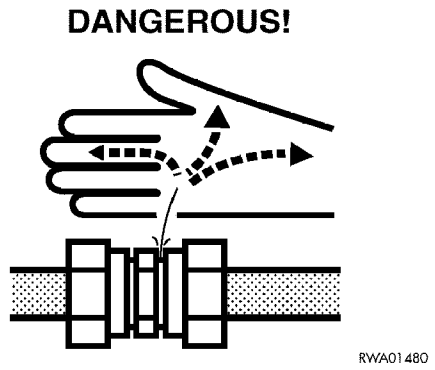
Repair or replace any loose or faulty fuel or hydraulic lines immediately. Do not operate the machine with damaged or leaking hoses or lines.

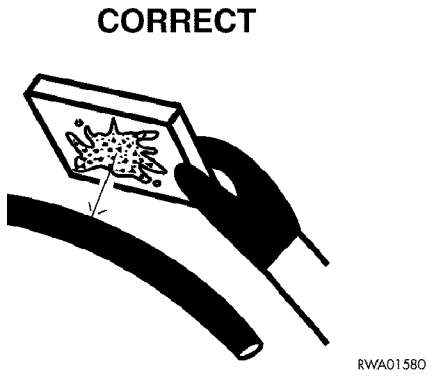
Remember that working hydraulic systems are always under pressure. If you have to add or drain hydraulic fluid, service or inspect the hydraulic system, lower the equipment to the ground and release system pressure and residual tank pressure before starting any work.

Leaks from pressurized hydraulic lines are extremely dangerous since the spray from them can penetrate your skin and enter the bloodstream, or the eyes.

Always wear thick gloves and protective goggles when working on the hydraulic systems Use a sheet of cardboard or plywood to search forleaks.

If you are struck by a jet of hydraulic fluid under pressure, or if you are injured even slightly, consult a doctor immediately for appropriate treatment.





HIGH TEMPERATURES AREAS

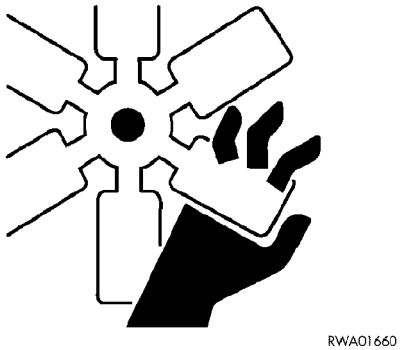
When you stop the machine at the end of a job, remember the engine coolant, oil, all engine parts, exhaust stack and the hydraulic system is still hot and under pressure. If you attempt to drain engine coolant, hydraulic fluid, or engine oil under these conditions, you expose yourself to various dangers, including the risk of serious burns.

Carry out maintenance procedures described in this manual only when the machine has had time to cool down.

ROTATING PARTS

Take particular care near rotating parts. Keep your body at a safedistance.

If hands, clothing, or tools become entangled in the fan blades or fan belt, severe injury may result. Keep well away from all rotating parts.

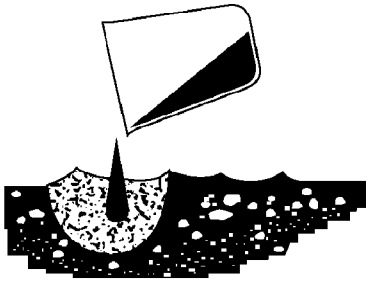


DISPOSAL OF WASTE MATERIALS

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.

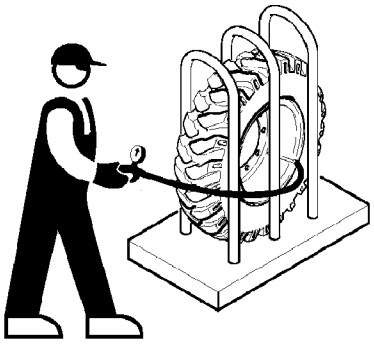


RWA01670

INFLATING TIRES

Always bear in mind that tires can burst while being inflated, causing serious accidents. 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 airgun with extension hose and pressure gauge.
- Make sure there is nobody in the vicinity before starting to inflate a tire. Stand at the tread side of the tire to inflate it.
- Never exceed the inflation pressures specified for each type of tire. Always check the tire pressures on both sides of the machine.



RWA01680

CRITICAL PARTS

Periodically some parts must be replaced due to safety purpose. Even if these parts seem to be in good condition and operating properly they may fail at some point causing possible injury to the operator or pedestrian. Listed are some of the systems containing these components that may fail under 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.

For additional information: See “PARTS SUBJECT TO WEAR THAT PERIODICALLY NEED CHANGING” on page 3-6.

VIBRATIONS TO WHICH THE OPERATOR IS EXPOSED

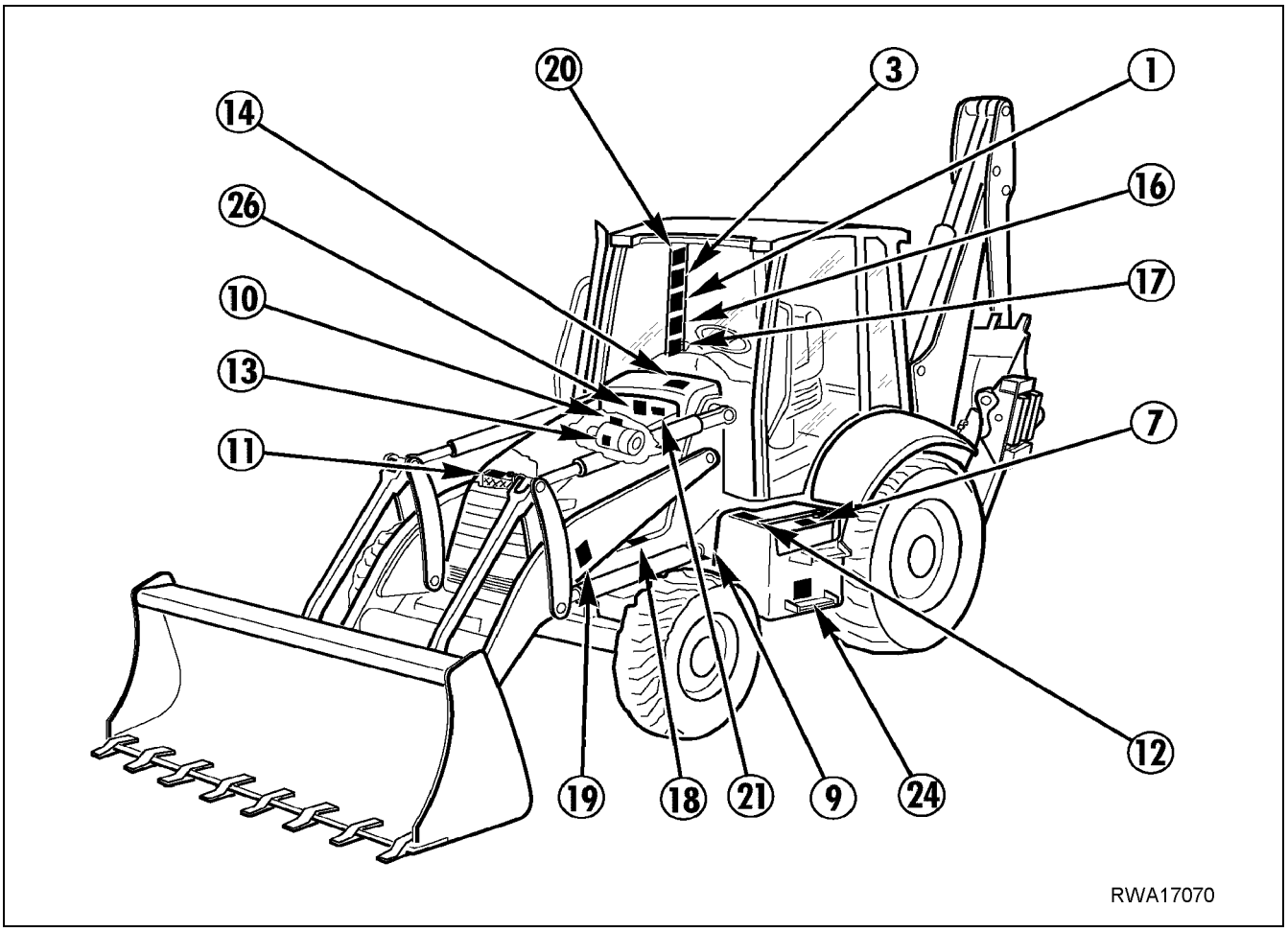
According to test results carried out to determine the vibrations transmitted to the operator by the machine, the upper limbs are subjected to vibrations lower than 2.5 m/sq.sec. (8.2 ft./sq.sec.). The seated part of the body is subject to vibrations lower than 0.5 m/sq. (1.7 ft./sq.sec.).

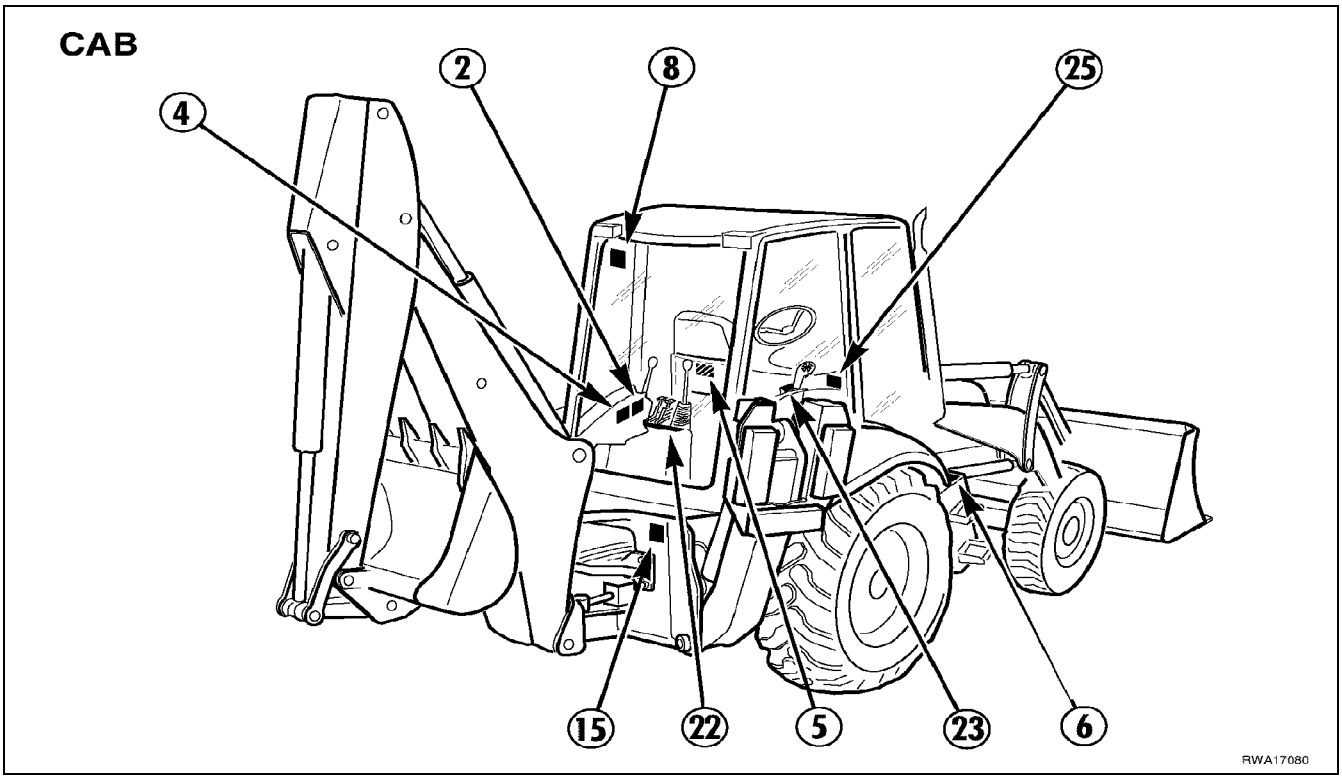
SAFETY AND WARNING DECALS

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

LOCATION OF THE SAFETY DECALS

- Your Komatsu Dealer can supply you with 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.




CAB
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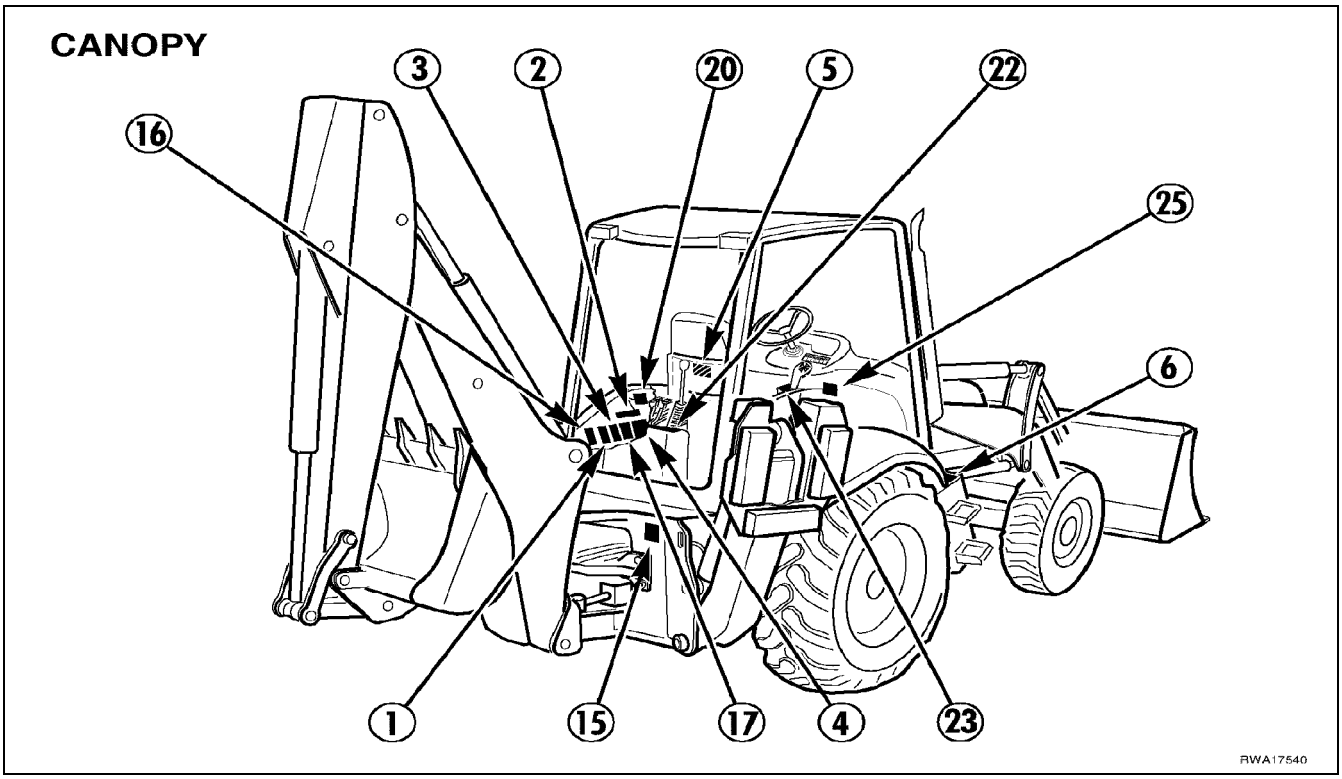
RWA17080


CANOPY
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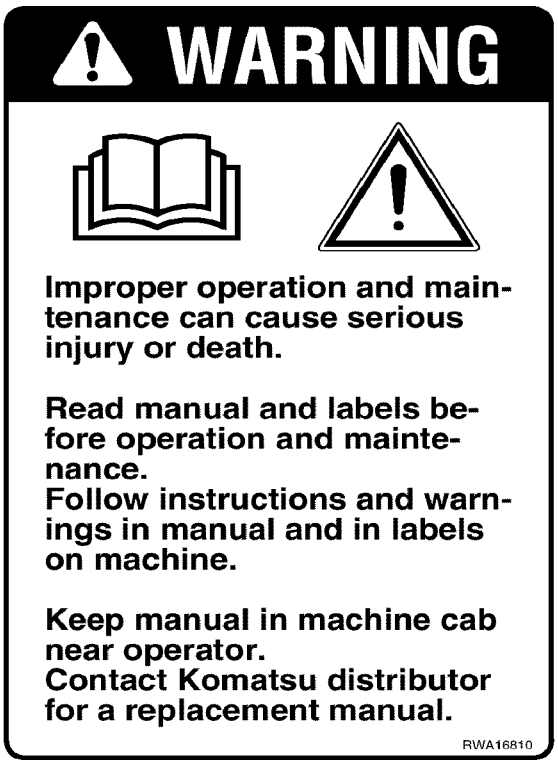
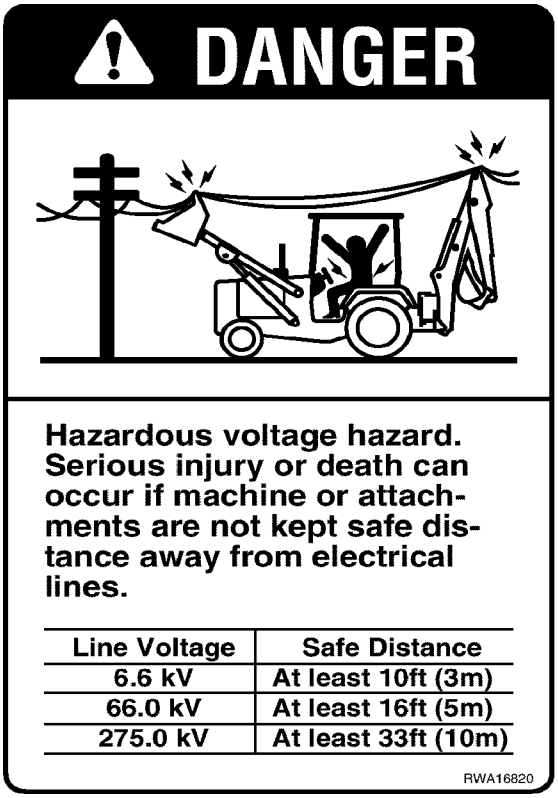
RWA17540

1. Warning Decal
   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 frequent reference.

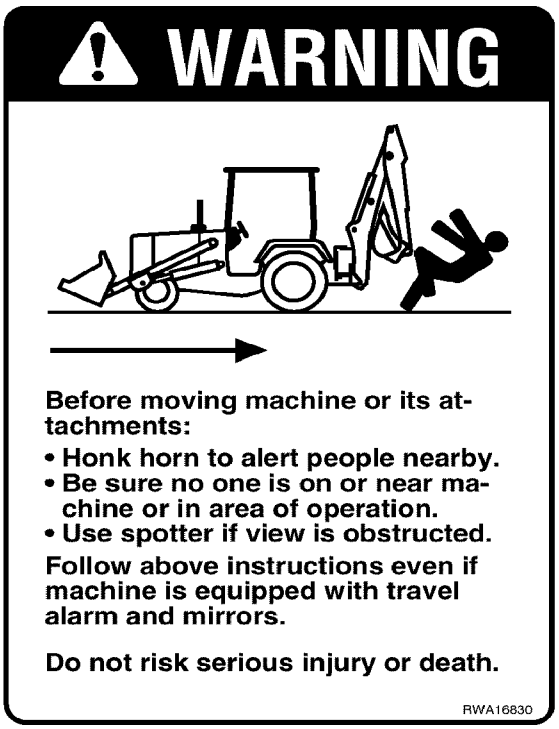


2. Height Decal
   It is always a good idea to be aware of your clearances around, in front, behind and especially above your work area or travel rout.

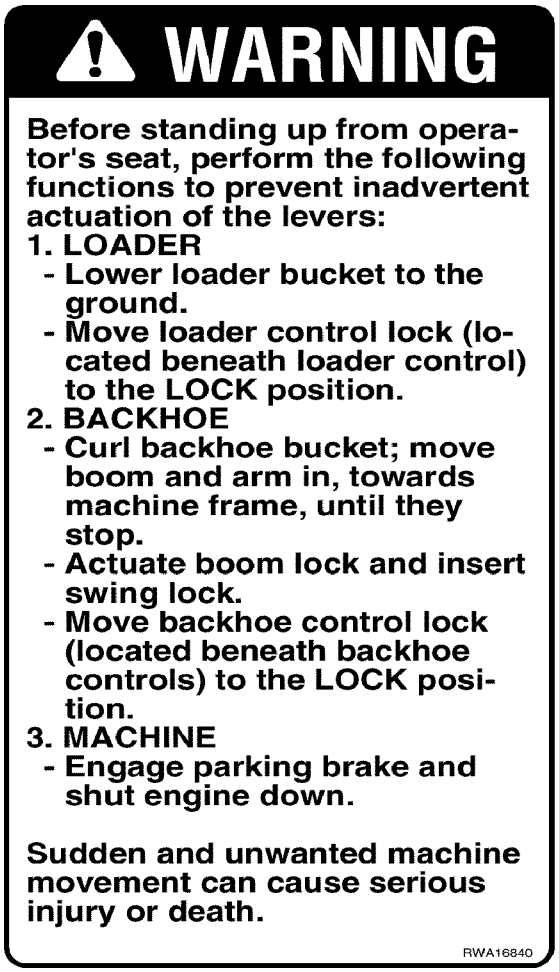
   Because of the additional height posed by the backhoe boom 1m (3 ft.) is added above the canopy when the machine is in the travel posture.



3. Warning Decal
   - 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.

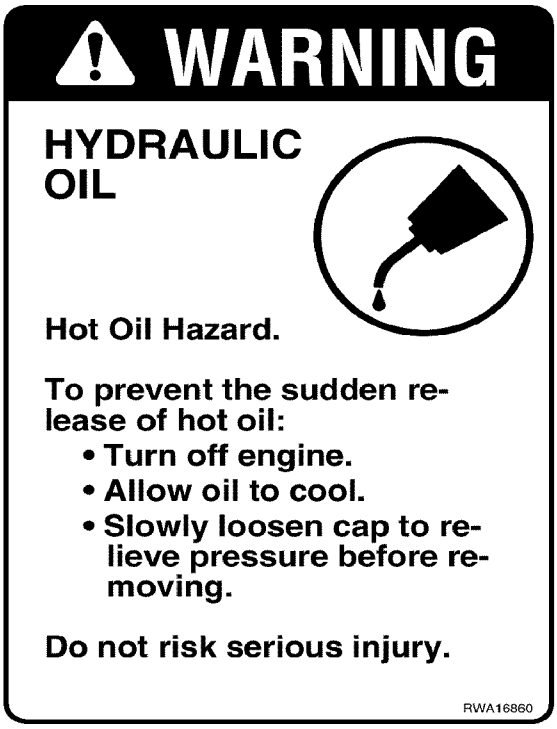


4. Sudden Movement
   Shut down procedures for machine.
   - Lower the loader bucket to the ground.
   - Lock the loader controls.
   - Curl the bucket and move the arm in towards the frame until they stop.
   - Activate the boom lock and insert the travel pin.
   - Lock the backhoe controls.
   - Engage the parking brake.

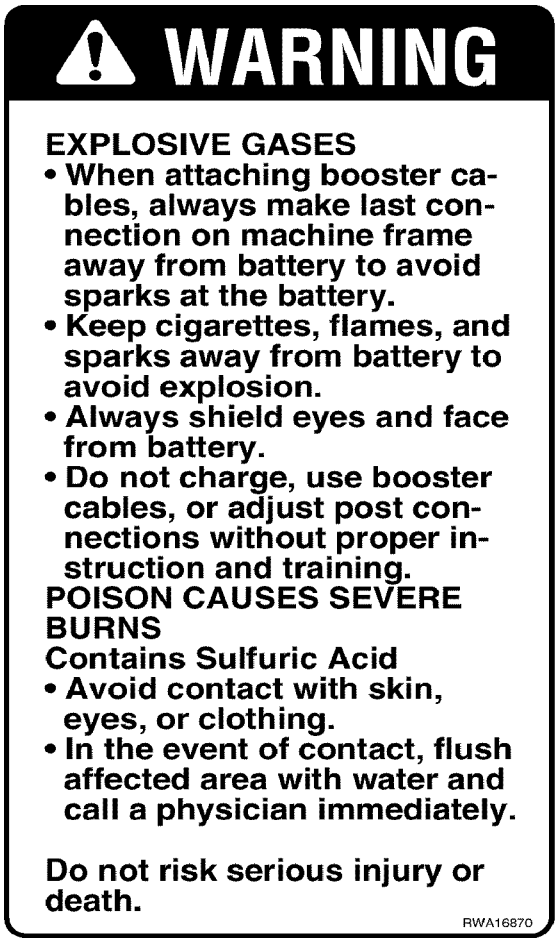


5. Do Not Operate Tag
   This warning tag must be kept with the machine at all times and used when maintenance or repairs are performed.

6. Hydraulic Oil
   Hot oil hazard.
   - Turn the engine OFF.
   - Allow the oil time to cool down.
   - Slowly loosen the cap to relieve pressure before removing.

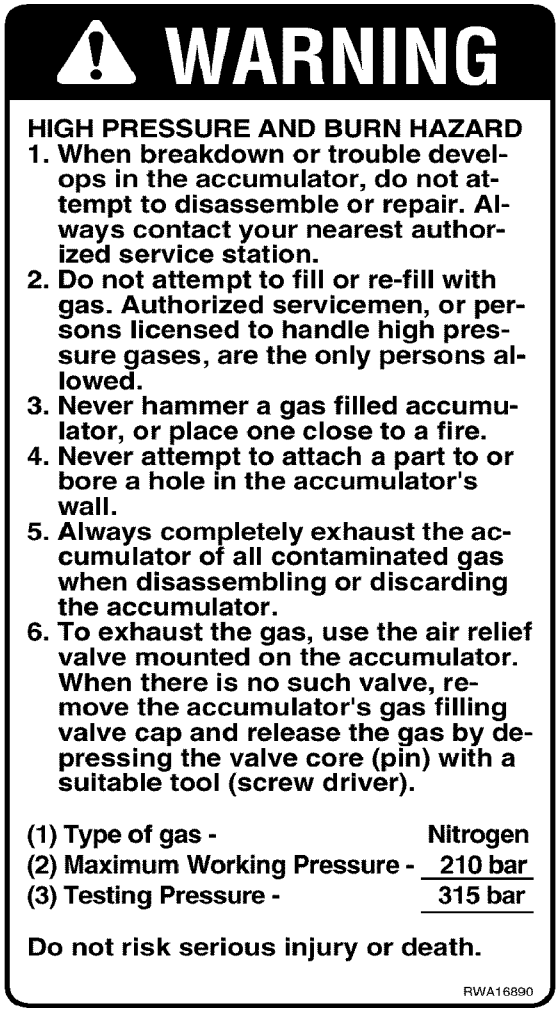


7. Battery Decal
   Battery safety precautions.
   - When attaching booster cables, always make the negative (-) connection last and at a remote location away from the battery.
   - Do not smoke or allow open flames or sparks near the battery.
   - Always ware a face shield when working with batteries.
   - 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. Window Warning
   When operating the window, be sure it is in the proper locked position to avoid sudden unexpected movement.

9. Accumulator (OPTIONAL EQUIPMENT)
   If your machine is equipped wit an 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.
   - The gas must be released before disposing of the accumulator, ask your distributor to do this for you.



10. Air Filter
    Air filter replacement:
    - Keep element free of damage or oil deposits.
    - For cleaning or replacement of the element, see “CHECKING, CLEANING, OR CHANGING AIR CLEANER CARTRIDGE” on page 3-56.
    - Do not use oil on this filter element.

11. Hot Coolant Hazard
    To prevent the sudden release of hot coolant:
    - Turn the engine OFF
    - Allow the system time to cool down.
    - Slowly loosen cap to relieve pressure before removing it.

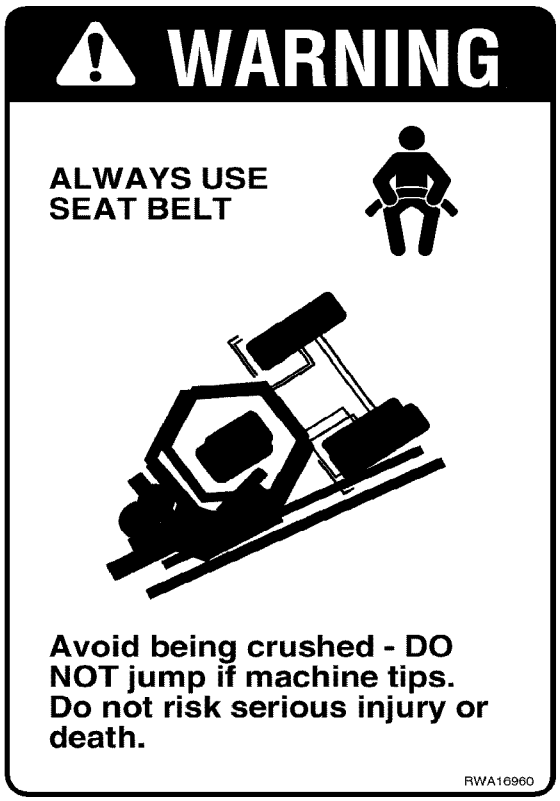
12. Fuel Tank
    Fuel tank precautions.
    - If the fuel tank should need draining, refer to the “Maintenance Manual” for proper procedures.

13. Do Not Use Ether
    Use of starting aids.
    - Use of any starting fluids including ether may cause explosion or damage the engine.
    - Never use starting aids to start the engine.

14. Running Engine Warning
    Rotating engine parts.
    - Keep away from rotating or moving engine parts.
    - Keep clear of the engine fan and fan belt.

15. Pinch Point Danger
    Crush or pinch points located on the machine.
    - 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.

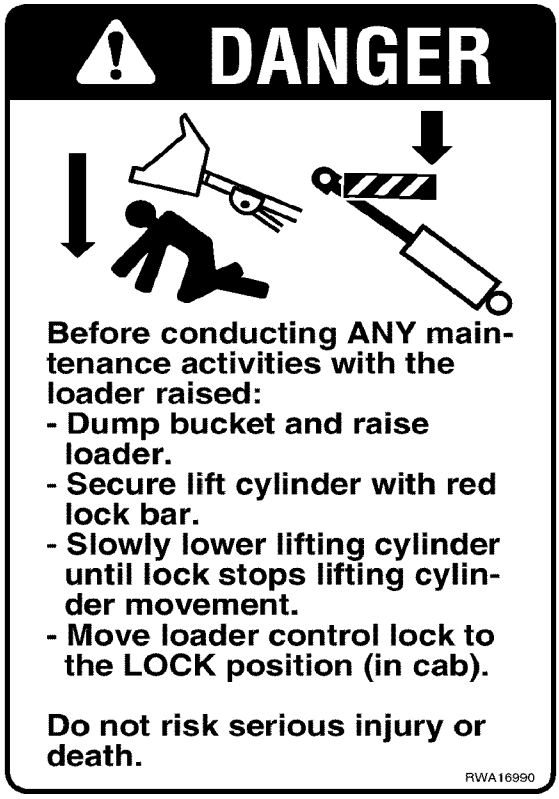
16. Seat Belt Warning
    The importance of using the sear belt equipped with your machine.
    - If the machine is equipped with a seat belt and rollover protective structure, OSHA law requires the operator remain within the confines of the rollover protective structure, with seat belt fastened snugly around their waist before operating the machine.



17. Blocking Wheels
    Parking on an incline.
    - Always block the wheels when parking on an incline.

18. Start Bypass Danger
    Jump starting the machine from outside the operator's cab.
    - Never bypass the starting circuit by jump starting your machine at the starter or any other point outside of the operator's cab.
    - Always start the machine from the operating position in the operator's cab with the seat belt fastened around your waist.

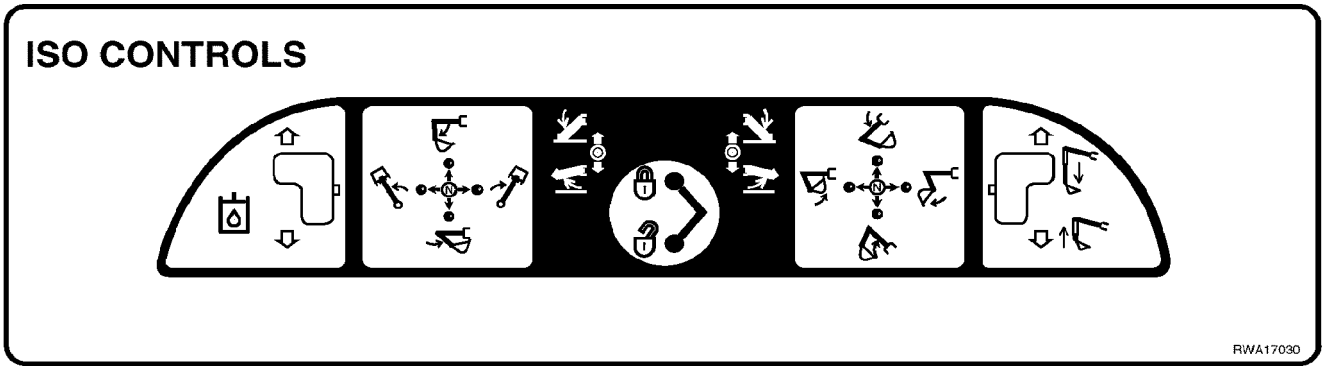
19. Loader Dangers
    Before doing any maintenance on the front part of the machine and the bucket, loader equipment must be raised:
    - Empty the bucket completely.
    - Raise the loader and install the safety bar.
    - Slowly lower the loader cylinder until all movement stops.
    - Lock the loader controls.

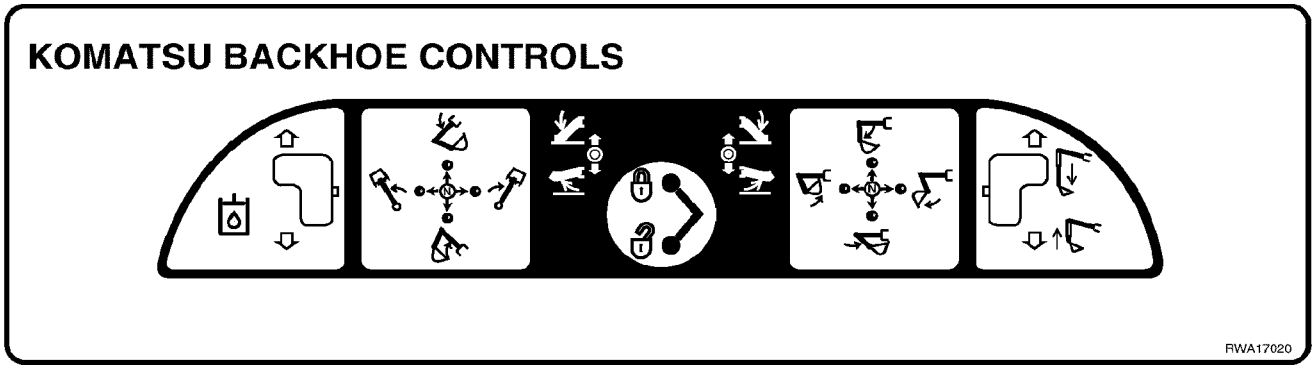


20. ROPS Structure
    Role Over Protective Structure cautions.
    - Never weld, drill or cut on the ROPS
    - If it becomes damaged, contact your Komatsu Dealer.

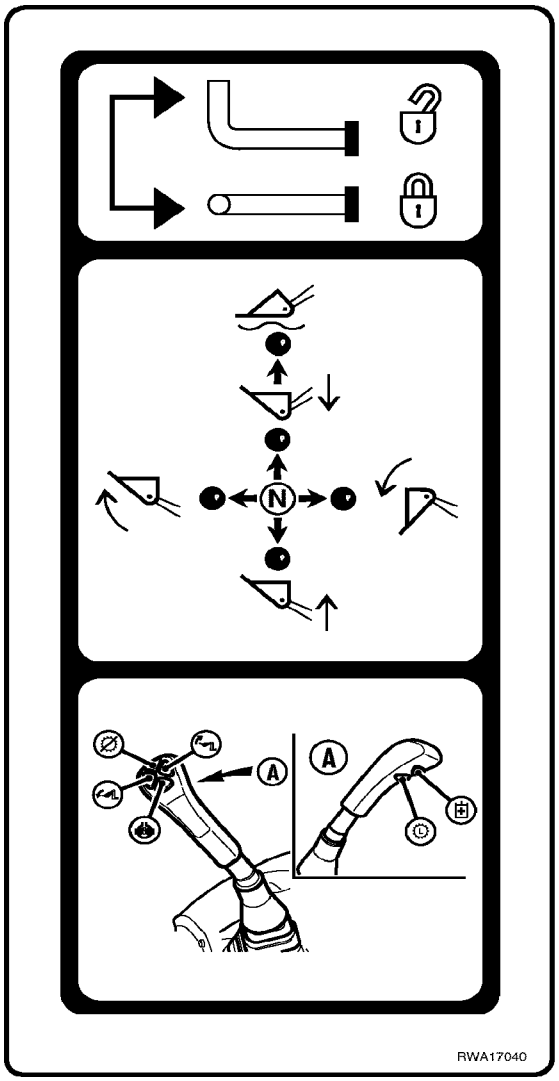
21. Brake Fluid
    Use the correct fluid in the hydraulic braking system. Using the wrong brake fluid may cause damage to the brake system which could lead to brake failure.

22. Backhoe Levers Operation

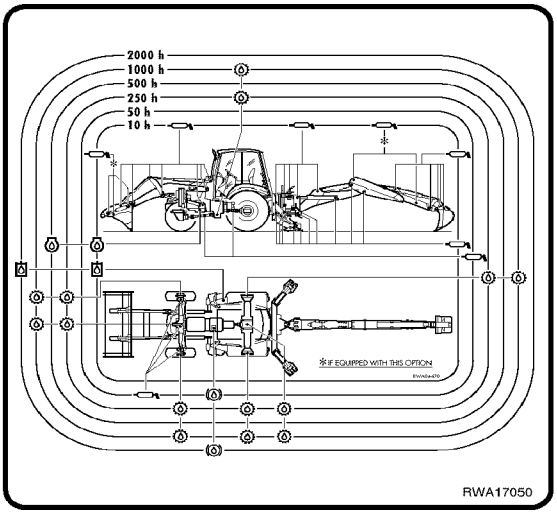




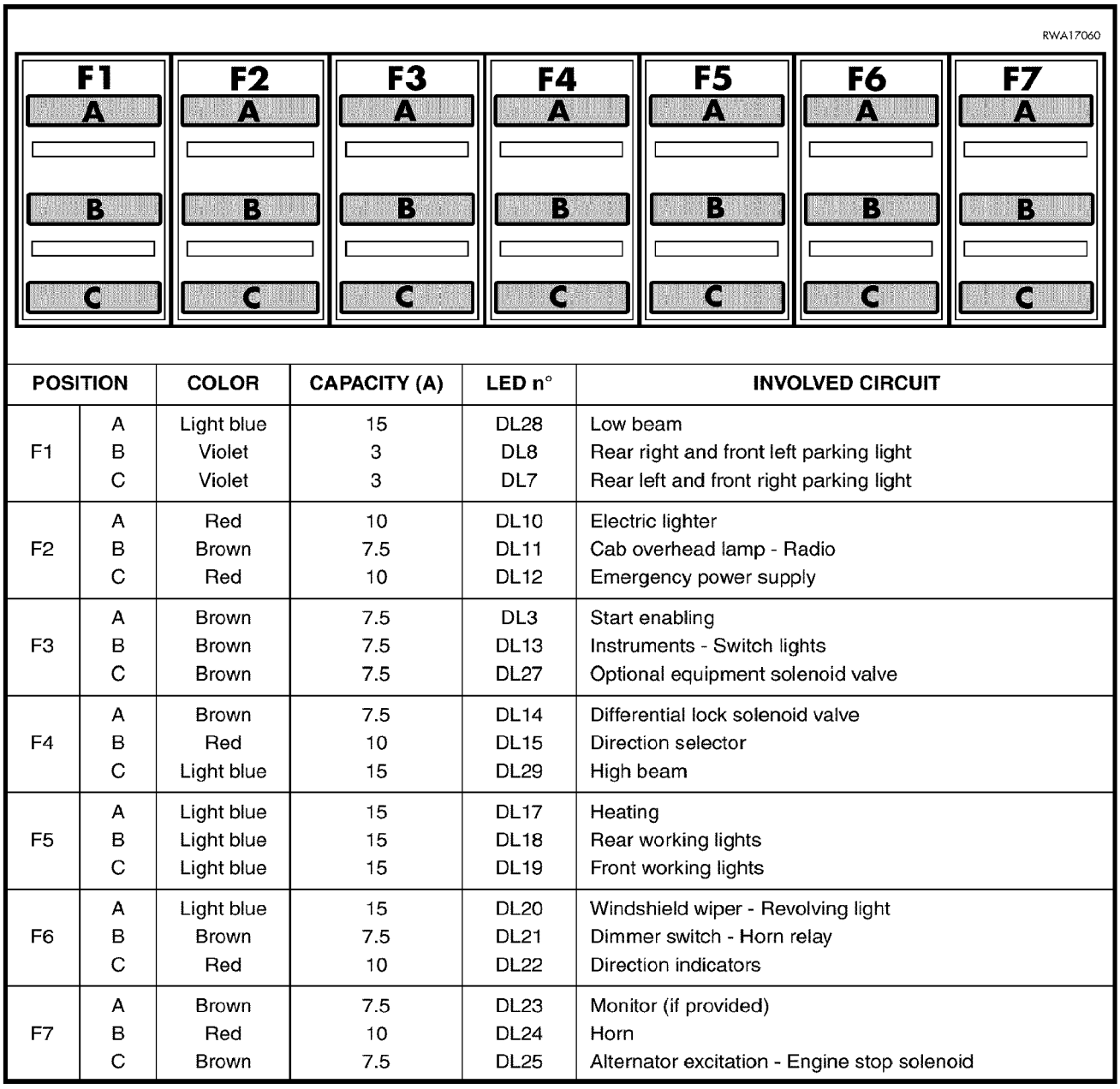
23. Loader Lever Control
    This decal is for the safety lock levers and switches on your loader work equipment. It shows:
    - Loader lever lock.
    - Bucket positions.
    - Switch functions.



24. Lubrication
    This decal is the lubrication chart for your machine it contains information on:
    - Lubricating time intervals.
    - Lubrication points.

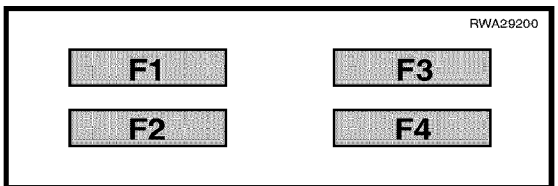


25. Equipment Fuse Decal



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

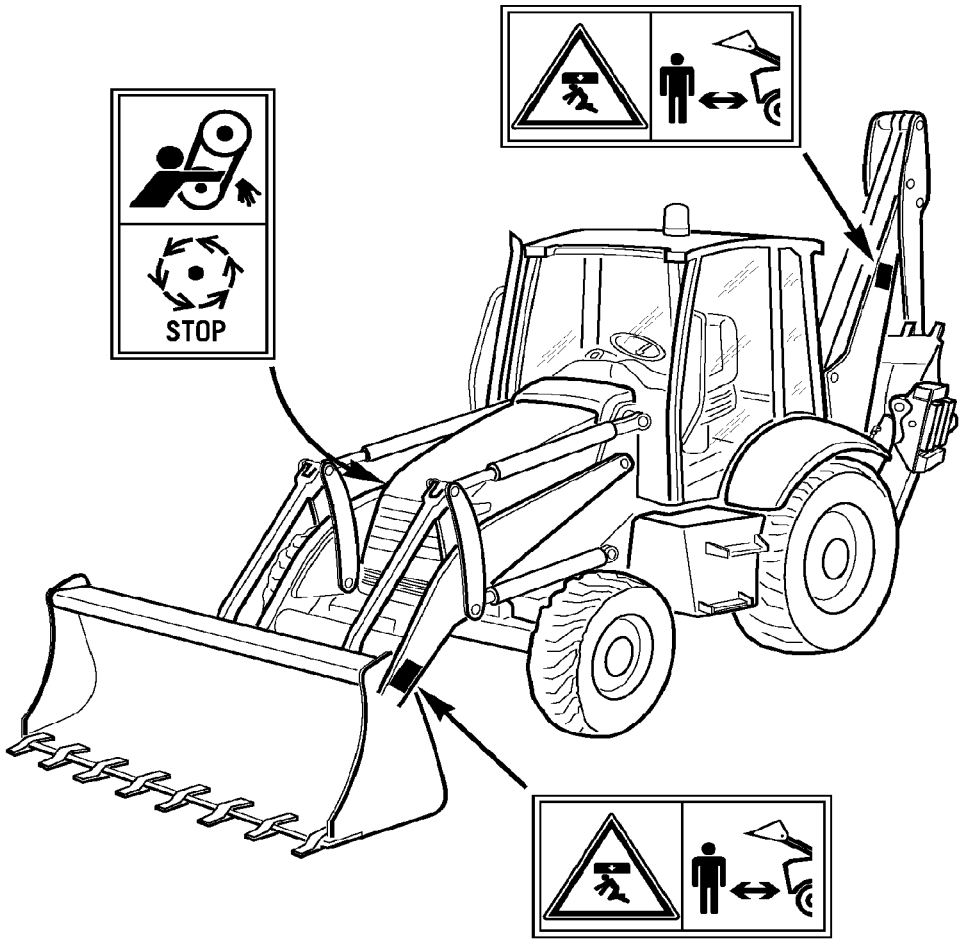
26. Engine Fuse Decal



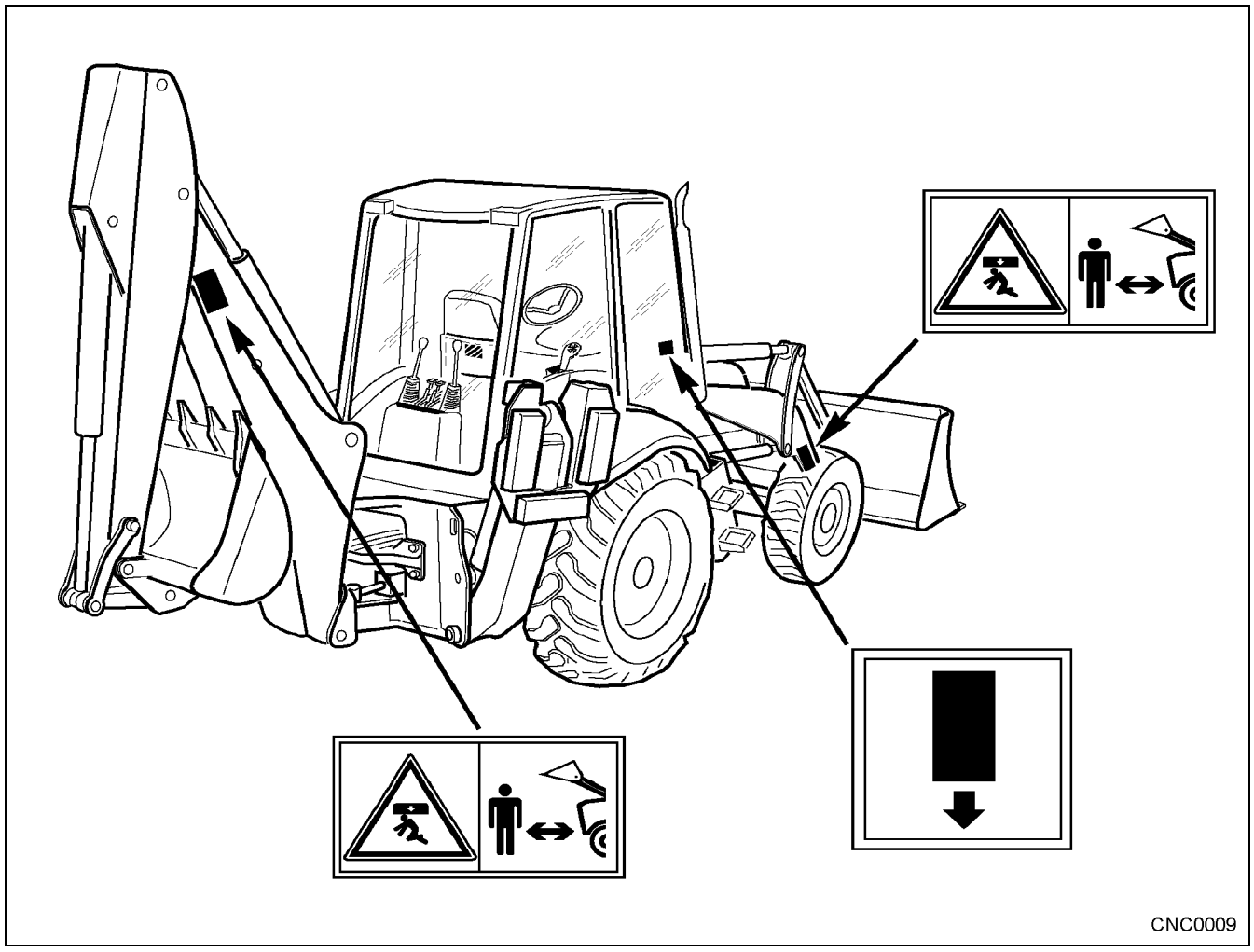
POSITION	COLOR	CAPACITY (A)	INVOLVED CIRCUIT
F1	White	80	Glow plug preheating
F2	Green	30	Engine stop
F3	Blue	60	Engine start
F4	White	80	Alternator

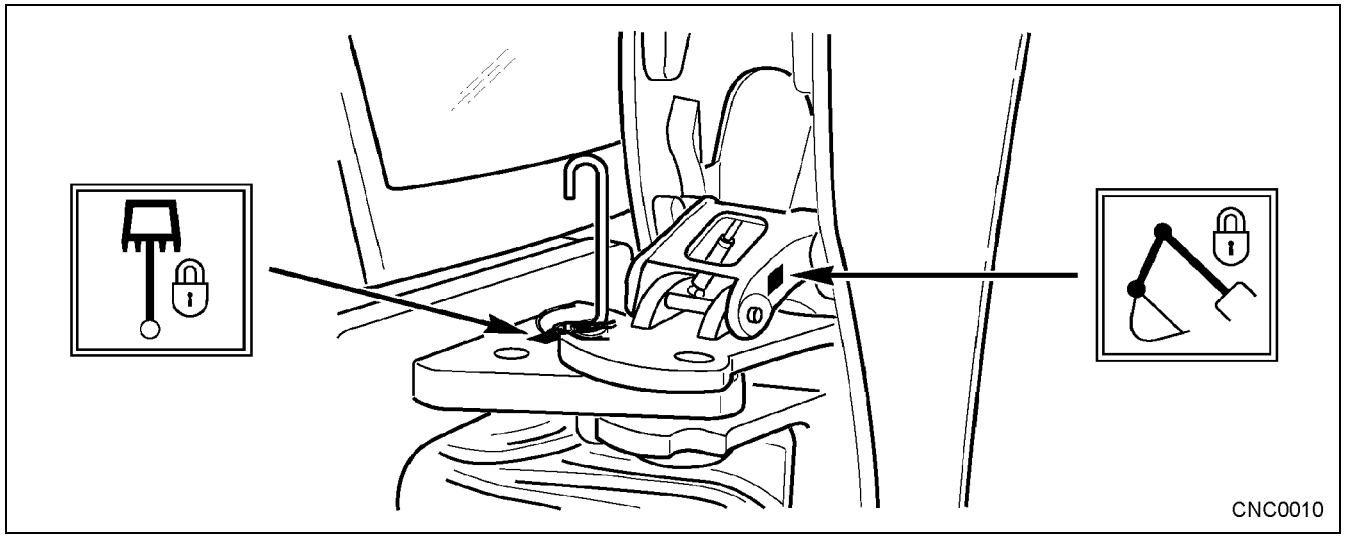
LOCATION OF THE PICTOGRAM DECALS

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



CNC0008


CNC0009

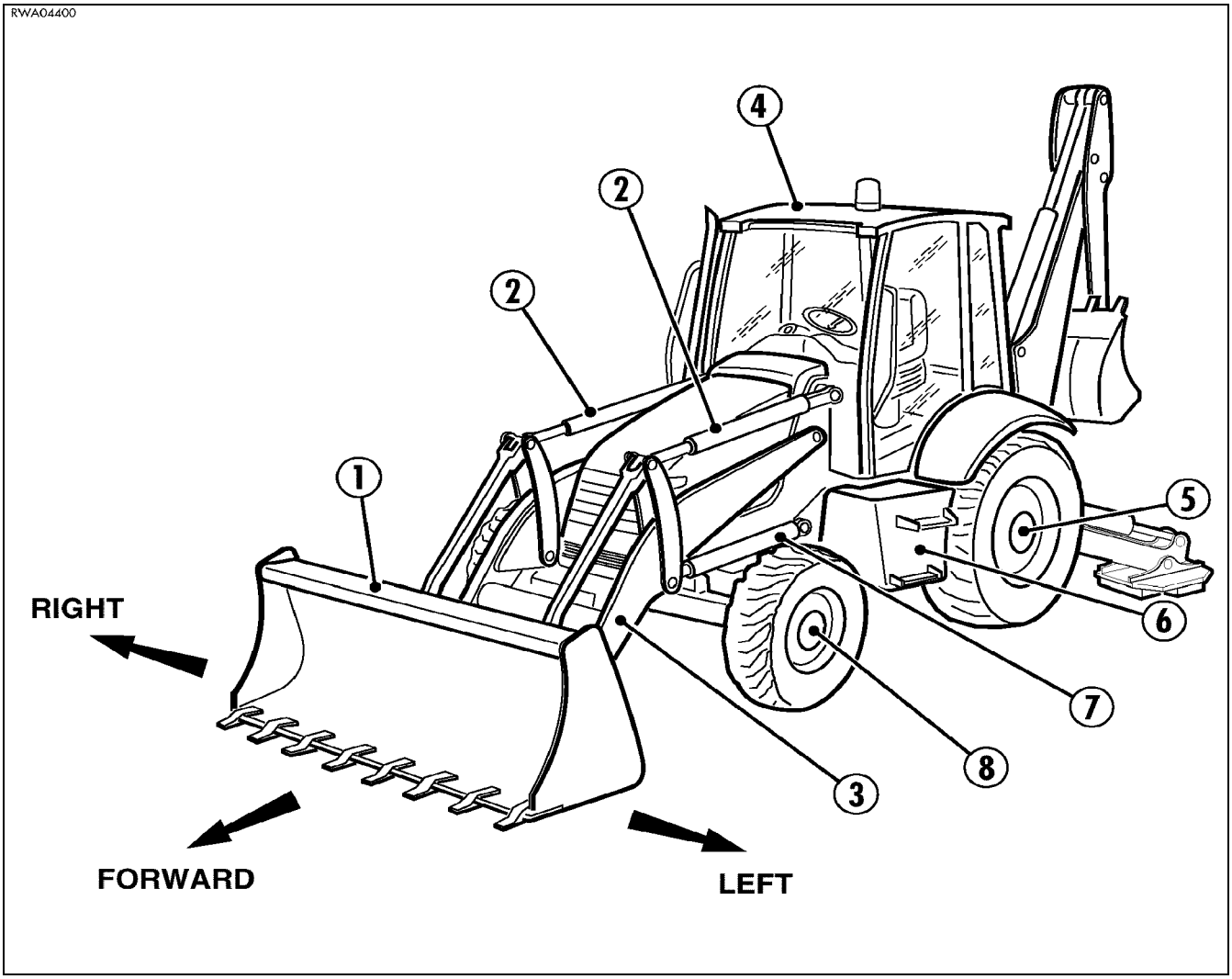

CNC0010

OPERATION

GENERAL VIEW OF MACHINE

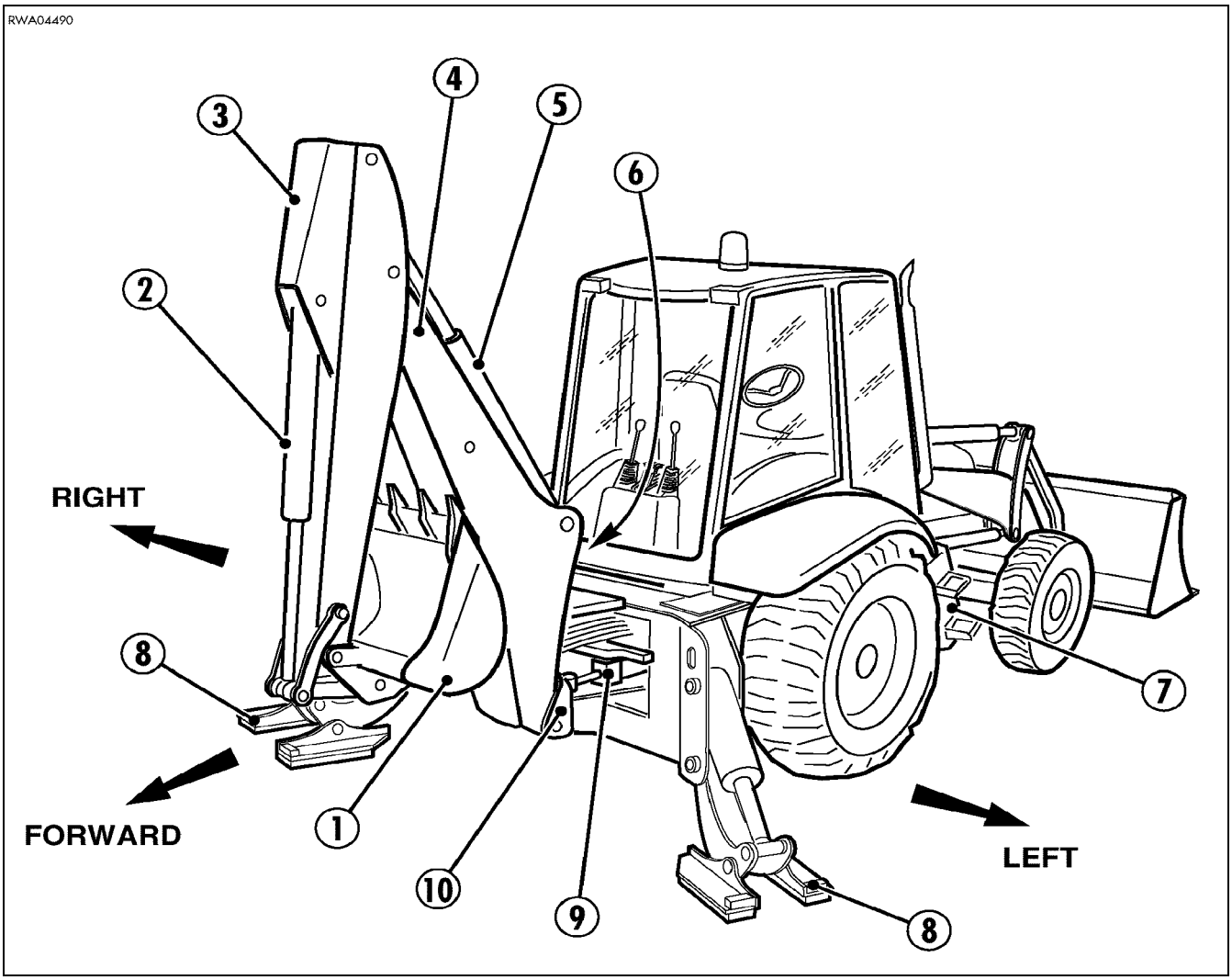
The views are taken from the operators seat facing forward and backward. For the front view, this would be for operator facing the front of the machine using the front end loader or traveling with the machine. For the rear view, this would be for the operator facing the rear of the machine using the backhoe unit. Keep in mind front and rear view references for this machine are different.

FRONT VIEW OF MACHINE



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

REAR VIEW OF MACHINE



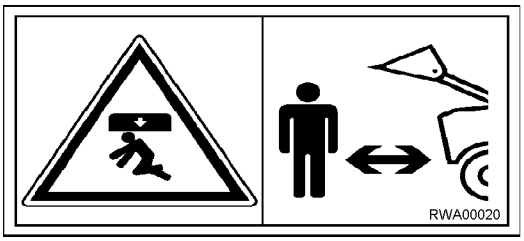
1. Bucket
2. Bucket Cylinder
3. Arm
4. Boom
5. Arm Cylinder
6. Boom Cylinder
7. Hydraulic Oil Tank
8. Outriggers
9. Boom Swing Cylinders
10. Boom Support Boss

PICTOGRAMS

The pictographs applied to the machine are there to alert the operator or maintenance personnel of system functions and possible dangers associated with the system. It is important for the operator or maintenance personnel to understand what these pictographs mean. It is also important to replace these pictographs if they become damaged or are missing. Below are a list of the pictographs equipped with your machine and there meanings.

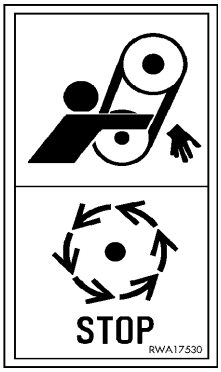
WORK AREA DANGERS

Do not allow personnel to approach the machine when the front end loader is in operation. Always maintain a clearance of 12m (40 ft.) away from any personnel any time the machine is in operating.



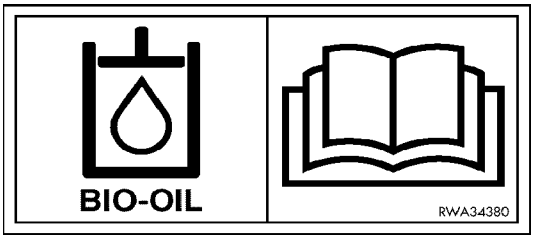
MOVING OR ROTATING ENGINE COMPONENTS

Always keep clear of rotating or moving parts especially in the engine compartment.

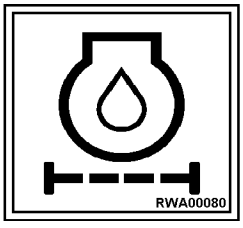


FILLING THE HYDRAULIC SYSTEM

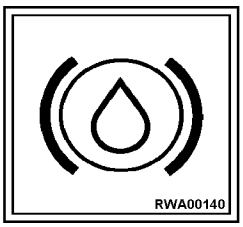
This is only for machines using biodegradable oil. (Type HEES)



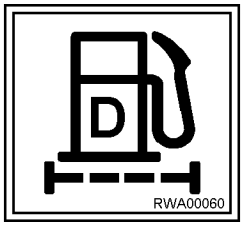
ENGINE OIL FILTER



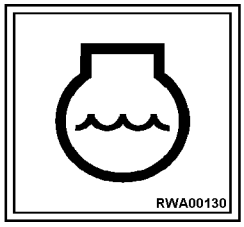
BRAKE FLUID



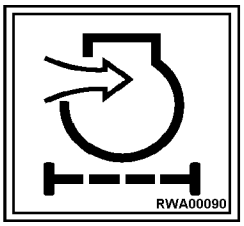
FUEL FILTER



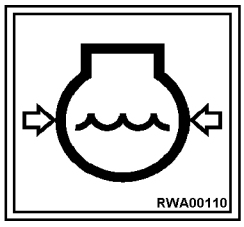
ENGINE COOLANT



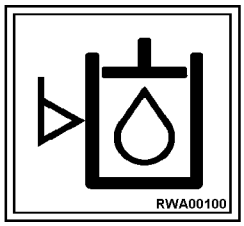
AIR FILTER



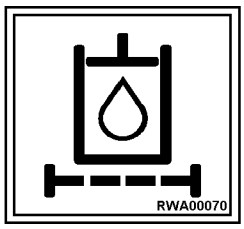
ENGINE COOLANT PRESSURE WARNING



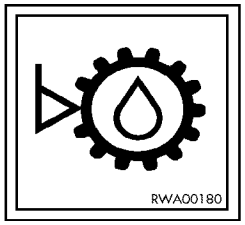
HYDRAULIC OIL LEVEL



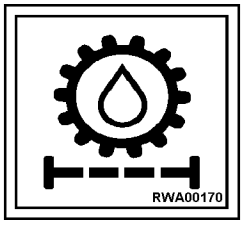
HYDRAULIC OIL FILTER



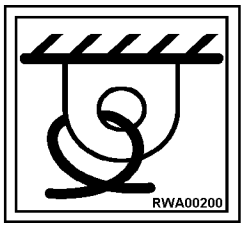
TRANSMISSION OIL LEVEL



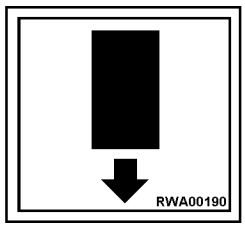
TRANSMISSION FLUID FILTER



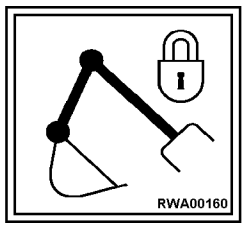
ANCHORAGE POINT



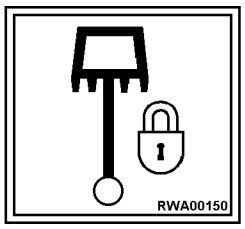
EMERGENCY EXIT



BOOM LOCK



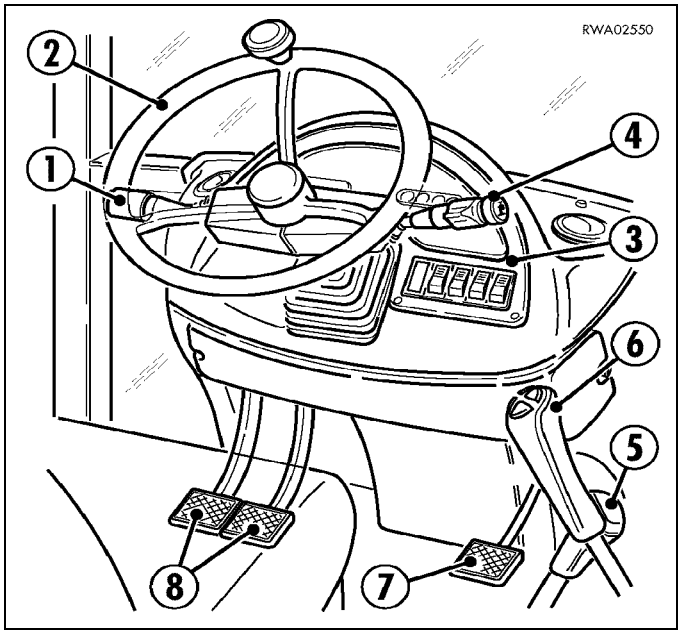
SWING LOCK

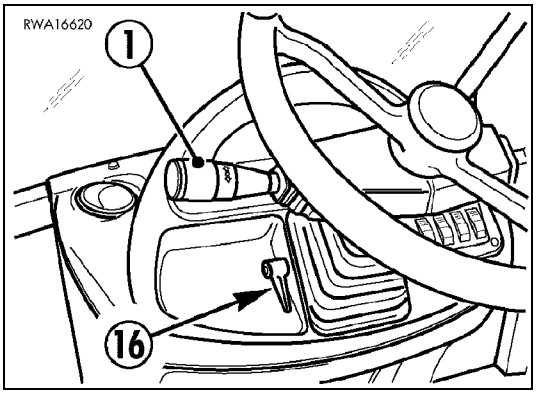


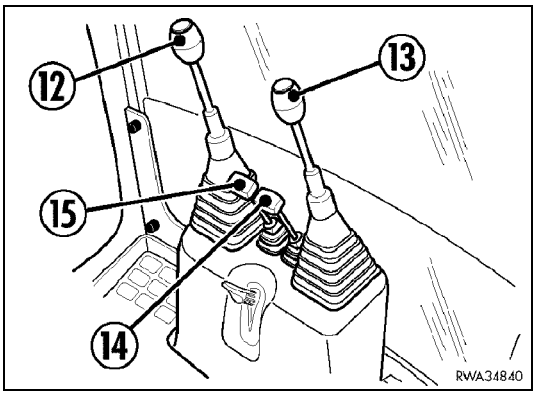
DESCRIPTION OF MACHINE OPERATION CONTROLS

Before operating the machine it is important to understand all the control functions equipped with your machine. Operating the machine without knowledge of all the controls may damage the machine, property or possibly cause injury to the operator.

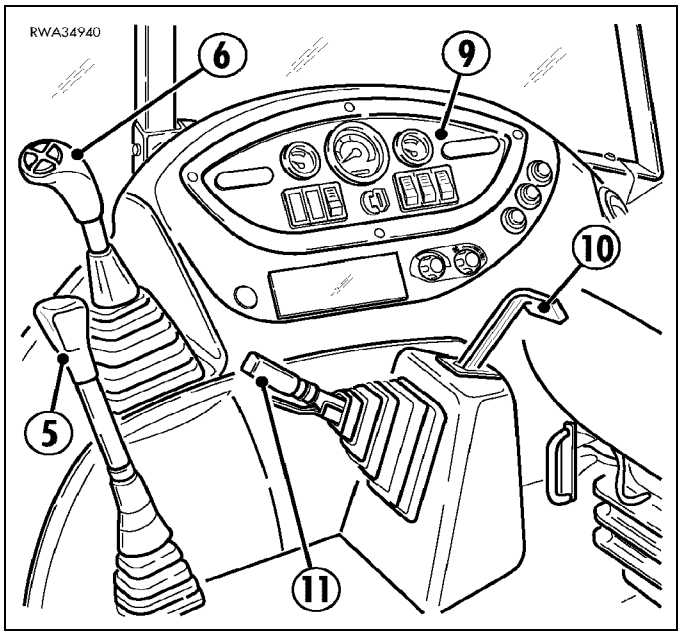
INSIDE THE CAB



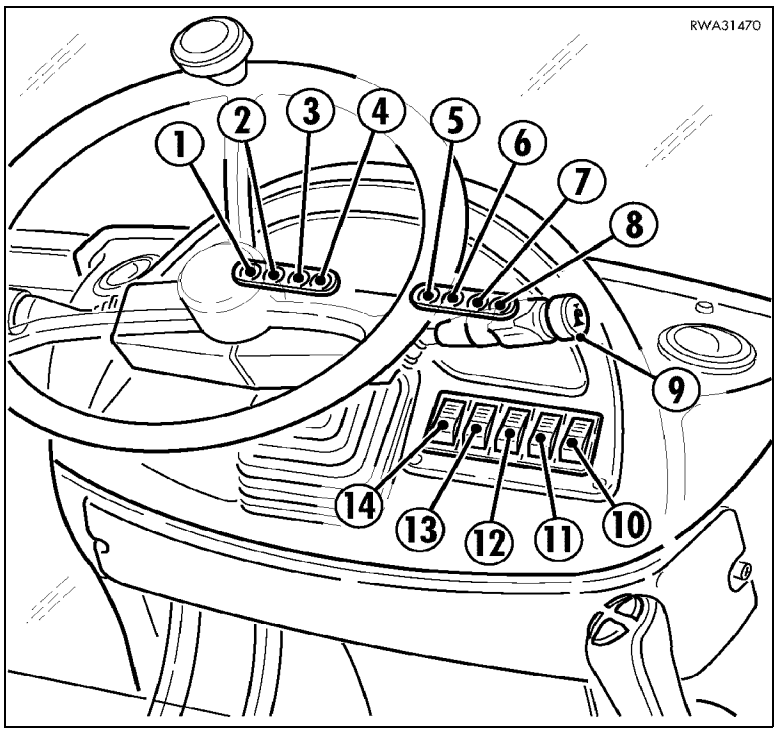




1. Direction control lever
2. Steering wheel
3. Front dash bezel
4. Turn signal and dimmer switch
5. Gear shift lever
6. Front end loader control lever
7. Accelerator pedal
8. Brake pedals
9. Side dash bezel
10. Throttle control lever
11. Parking brake
12. Left backhoe wobble stick
13. Right backhoe wobble stick
14. Right outrigger control
15. Left outrigger control
16. Steering wheel adjustment (optional)



FRONT INSTRUMENT BEZEL AND CONTROLS



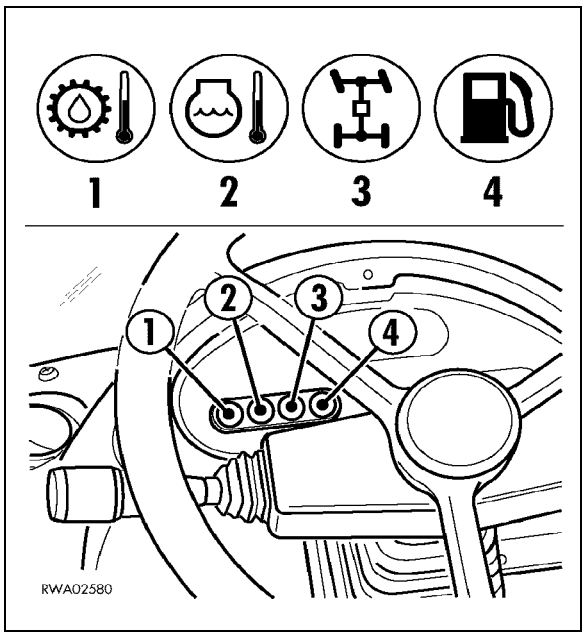
1. Transmission oil temperature alert
2. Engine coolant temperature alert
3. Four-wheel drive IN/OUT indicator
4. Low fuel warning
5. Directional signal indicator
6. High beam indicator
7. Parking brake and brake fluid alert
8. Differential LOCK/UNLOCK indicator
9. Multifunctional directional switch
10. Four-wheel drive switch
11. Windshield wiper/washer switch
12. Front work lamps switch
13. Emergency (HAZARD) switch
14. Optional switch locations

TRANSMISSION OIL TEMPERATURE ALERT

This warning light (1) comes on along with an audible alarm to alert the operator of a transmission oil overheat condition. If this warning and alarm should come on, immediately stop the machine and select neutral gear. Let the transmission oil cool down with the engine running at about 1200 RPM until the warning and alarm stop. If this should occur repeatedly have the machine checked by an authorized Komatsu Dealer. Do not continue to operate the machine.

ENGINE COOLANT TEMPERATURE ALERT

This warning light (2) comes on along with an audible alarm to alert the operator of an engine overheat condition. If this warning and alarm should come on, immediately stop the machine and select neutral gear. Let the engine run at about 1200 RPM until the warning and alarm stop. If this condition should occur again, check to make sure the radiator fins are clean and free of debris. Do not continue to operate the machine if the engine is overheating.



FOUR-WHEEL DRIVE (IN/OUT) INDICATOR

When the four-wheel drive feature (3) is selected this indicator will come on indicating the four-wheel drive system is (**IN**) operation. When the indicator is off, the four-wheel drive system is (**OUT**) of operation.

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. Re-fuel the machine as soon as possible. Avoid running the machine out of fuel, damage to the injection system may result.

DIRECTIONAL SIGNAL INDICATOR

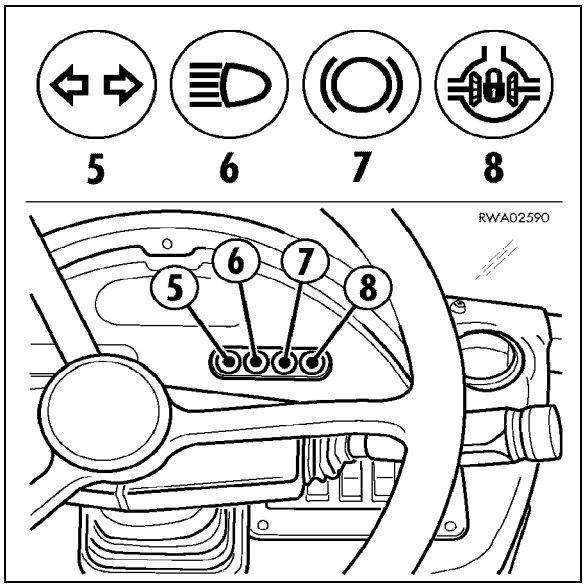
This indicator (5) comes on intermittently when lever (9) or the emergency (HAZARD) switch is operated.

HIGH BEAM INDICATOR

This indicator (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 AND BRAKE FLUID ALERT

This warning lamp (7) indicates the parking brake has been set or the brake fluid level is low. This light should come on when the parking brake is set and go off when the parking brake is released. If this warning lamp should come on 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

When the differential lock feature is in (**LOCK**), the indicator lamp (8) will come on indicating it is in operation. 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:

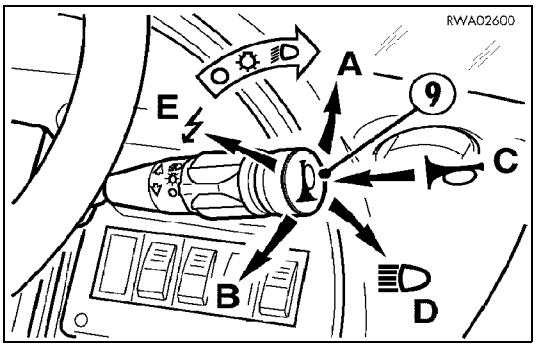
A. Turn Left

B. Turn right

C. Horn

D. High/Low beam control

E. Flash

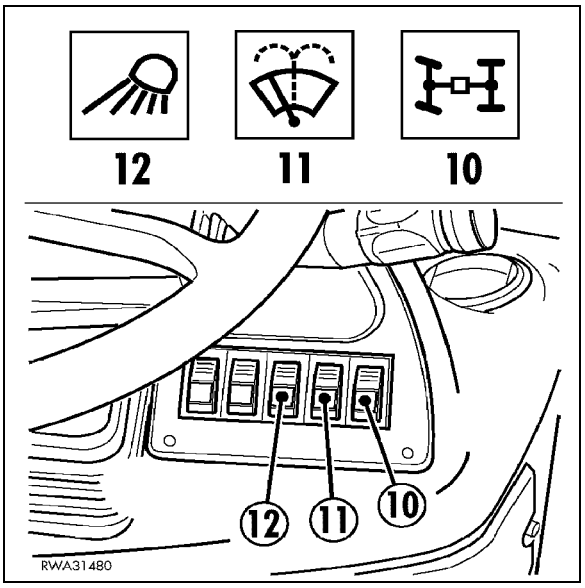


FOUR-WHEEL DRIVE SWITCH

This is a two position feature. When the four-wheel drive switch (10) is pressed the four-wheel indicator (3) comes on indicating the machine is in four-wheel drive. When the switch is pressed again the four-wheel drive feature is disengaged.

Remark

Do not use the four-wheel drive feature on dry roads. The four-wheel drive feature will be automatically engaged when the brake pedals are pressed, only when 4th gear is engaged.



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 washer.

FRONT WORK LAMPS SWITCH

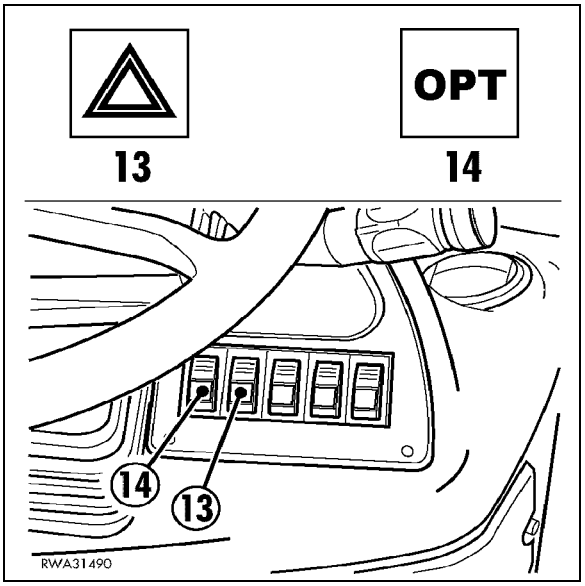
This switch operates the front work lamps only (12)

EMERGENCY (HAZARD) SWITCH

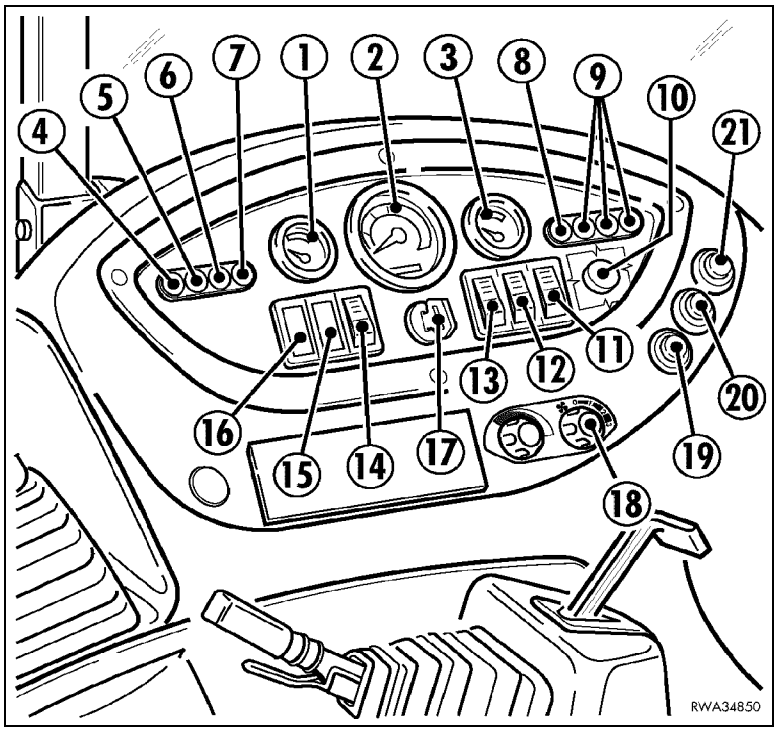
This switch operates the four-way (HAZARD) flashers (13) when turned on. This feature must be used when traveling on roadways or when working in areas that need additional warnings.

OPTIONAL EQUIPMENT SWITCH

This location is for any optional equipment (14).

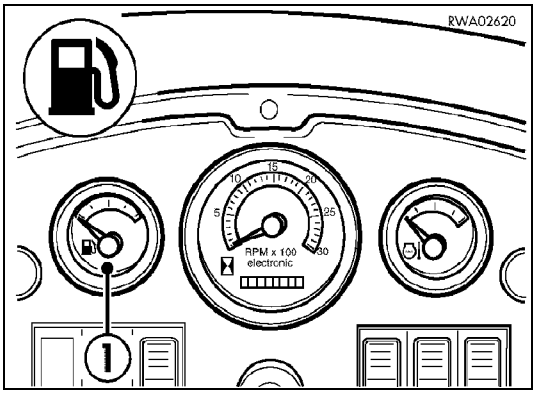


SIDE INSTRUMENT BEZEL AND CONTROLS



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

1. Fuel level gauge
2. Tachometer and hour meter
3. Engine coolant temperature gauge
4. Air cleaner restriction alert
5. Engine oil pressure alert
6. Glow plugs preheat indication
7. Alternator alert



FUEL LEVEL GAUGE

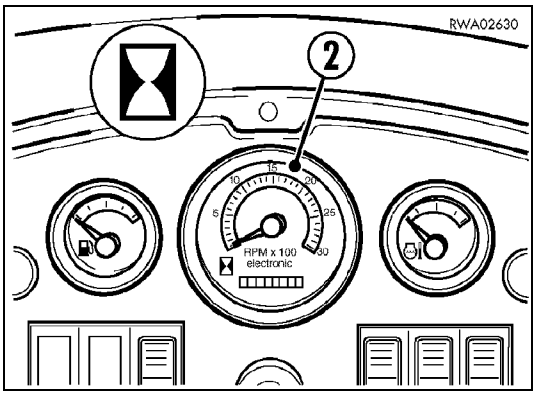
This gauge (1) will indicate the amount of fuel in the fuel tank.

TACHOMETER AND HOUR METER

This gauge (2) indicates the engine RPM (Revolutions Per Minute). It also indicates the running hours on the engine

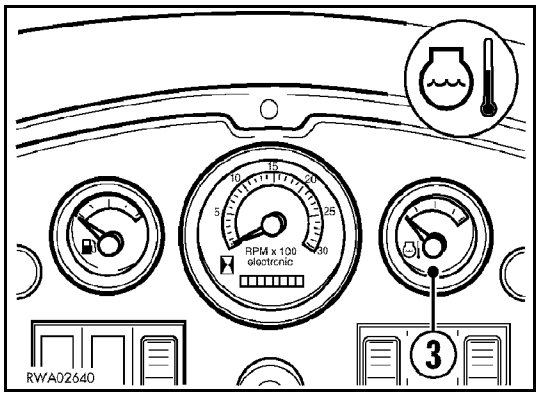
Remark

The hour meter is considered valid for calculating the maintenance or service hour intervals for the machine.



ENGINE COOLANT TEMPERATURE GAUGE

This gauge (3) indicates the engine coolant temperature which must be in the operating range between 80 - 85 °C (176 - 185°F) Always allow the engine ample time to warm up to within these operating ranges before working the machine. Never allow the engine to exceed these operating temperatures, damage to the engine could occur.

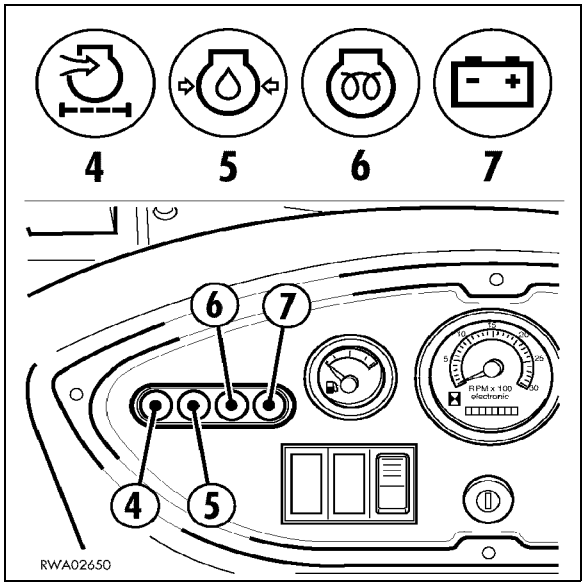


AIR CLEANER RESTRICTION ALERT

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

ENGINE OIL PRESSURE ALERT

This warning lamp (5) comes on along with an audible alarm to alert the operator of an engine oil pressure loss. If this light should come on during operation or remain on after start-up, shut the engine down immediately. If this light does not come on when the ignition key is turned on, have the system checked by your Komatsu dealer. Do not operate the machine if this light comes on intermittently or remains on, damage to the engine may result.



GLOW PLUGS PREHEAT INDICATION

In cold weather during initial start-up there is a need to preheat the combustion air to aid in starting the engine. To use this feature, hold the ignition switch in the preheat position for approximately 30 seconds, the indicator light (6) will come on and remain on for about 30 seconds, after the light goes out the engine may be cranked. This procedure may have to be repeated one more time. See “STARTING THE ENGINE IN COLD WEATHER” on page 2-32.

⚠ WARNING

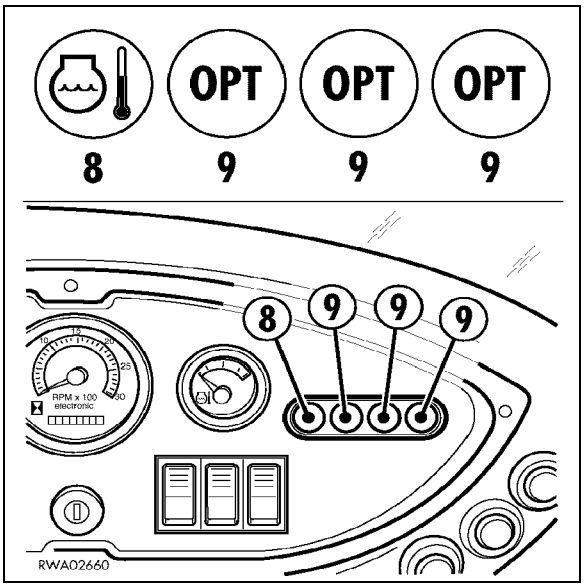
Due to the glow plug feature equipped with this machine, do not use Ether or other starting aids. Damage to the engine or possible injury to the operator may result.

ALTERNATOR ALERT

This warning light (7) comes on along with an audible alarm to alert the operator that the battery is not charging. If this light should come on during operation or remain on after initial start-up have the charging system checked as soon as possible by an authorized Komatsu Dealer.

ENGINE COOLANT TEMPERATURE ALERT

This warning light (8) comes on along with an audible alarm to alert the operator of an engine overheat condition. If this warning and alarm should come on, immediately stop the machine and select neutral gear. Let the engine run at about 1200 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.



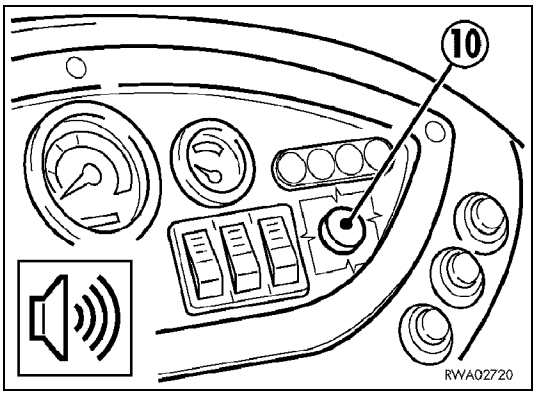
OPTIONAL EQUIPMENT ALERT

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

AUDIBLE WARNING SYSTEM

When the ignition switch is on or the machine is in operation this audible alarm (10) will sound if:

- The engine oil pressure is low
- The engine is overheating
- The transmission is overheating
- The charging system has failed



REAR WORK LAMPS

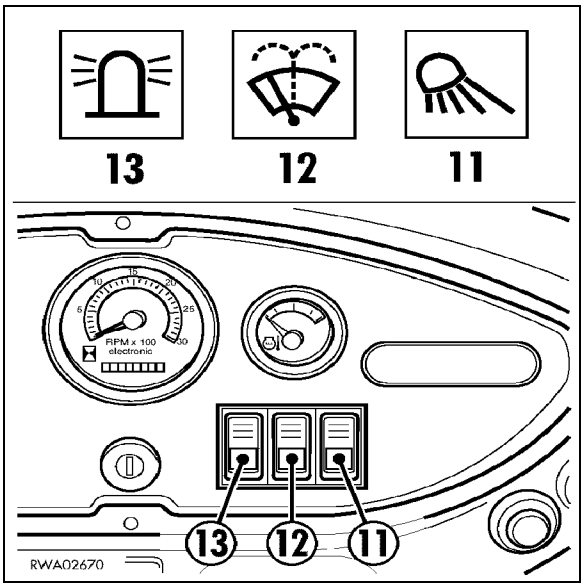
This switch (11) is for the operation of the rear work lamps.

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

(If equipped) This switch (13) is for operating the rotating or flashing light mounted on top of the ROPS.



REAR HORN

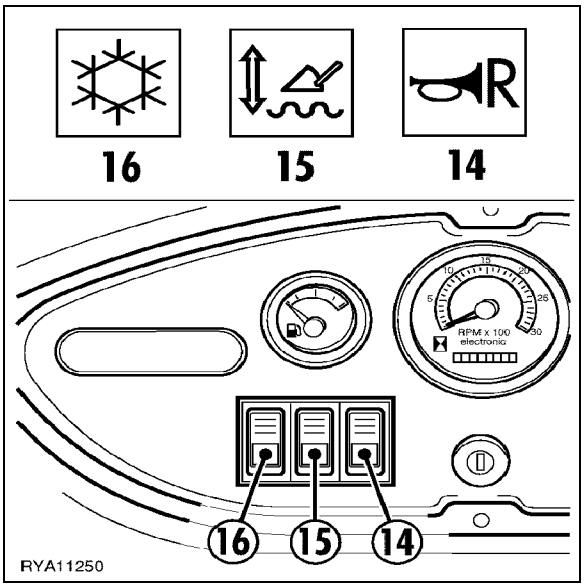
This switch (14) activates the rear horn. This horn is to warn people in the area before you start your work operations.

LOAD STABILIZER SWITCH (OPTIONAL)

When this switch (15) is turned on the load stabilizing system is activated. This feature is used to help stabilize the machine when the loader bucket is loaded and you are traveling on rough ground.

AIR CONDITIONING SWITCH (OPTIONAL)

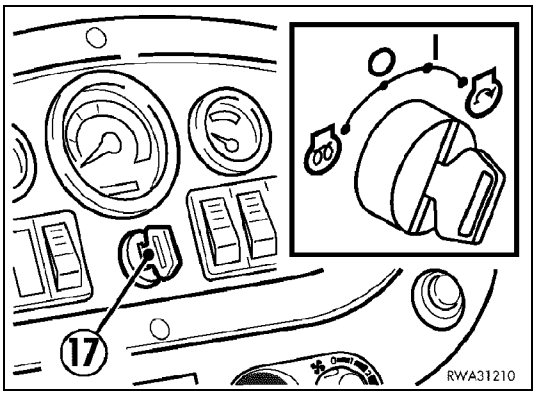
When this switch (16) is turned on the air conditioning system is in operation. When the switch is off the air conditioning system is deactivated.



IGNITION SWITCH

The ignition switch (17) is the main switch, it is a rotary switch with four positions

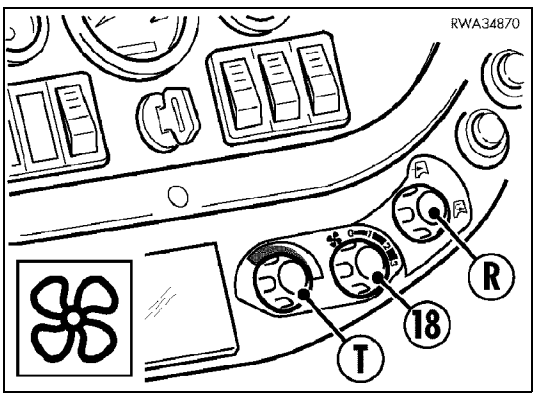
- Preheat
- OFF
- ON
- Start



BLOWER SWITCH

The blower switch (18) is used to control the operation of the blower motor for the air circulation, it has three speeds:

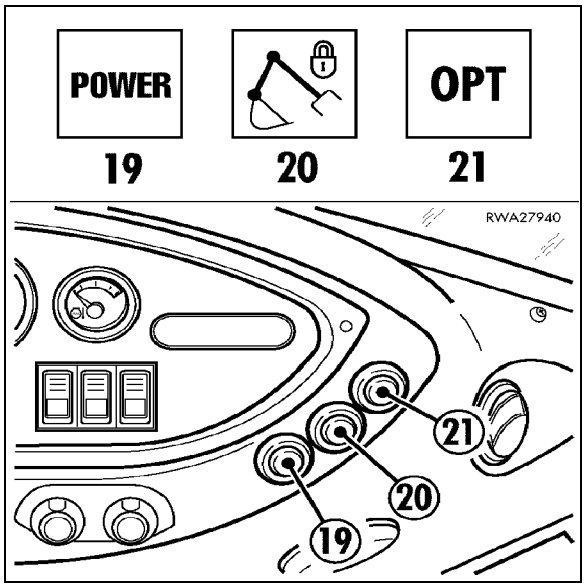
- Low
- Medium
- High



See “CAB ENVIRONMENT AND SAFETY EQUIPMENT” on page 2-21.

BACKHOE POWER CONTROL SWITCH

This button (19) operates the selection of oil delivery from the hydraulic pump. When the machine is started the control automatically selects the POWER mode (switch illuminated) which gives you the maximum brake out power at the backhoe. When the button is pressed again, the backhoe goes into the economy mode reducing brake out power. This feature is used for excavating light material, operating optional attachments or using the backhoe for grading purpose. If the machine is operated in the forward or reverse gears the POWER mode is automatically canceled.



BACKHOE BOOM LOCK SWITCH

This button (20) operates the boom lock. This function holds the backhoe in the parked position thus preventing hydraulic drift of the backhoe unit.

This feature should be used when operating the front end loader or traveling with the machine.

OPTIONAL SWITCH LOCATIONS

This switch location (21) is for optional equipment is needed.

FRONT END LOADER CONTROLS

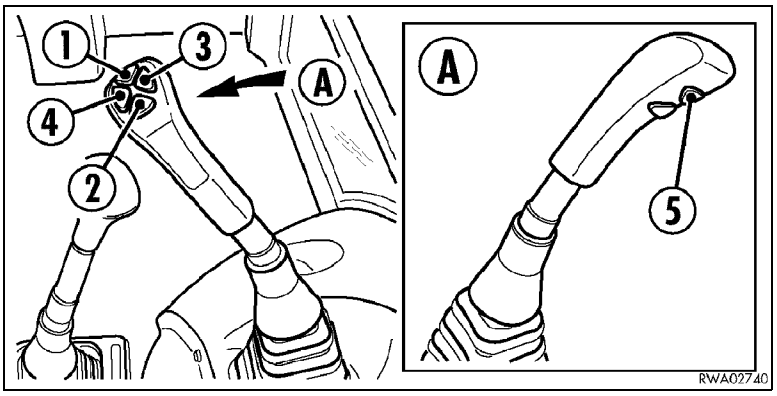
1 Loader declutch control button

2 Differential lock button

3 Bucket open button

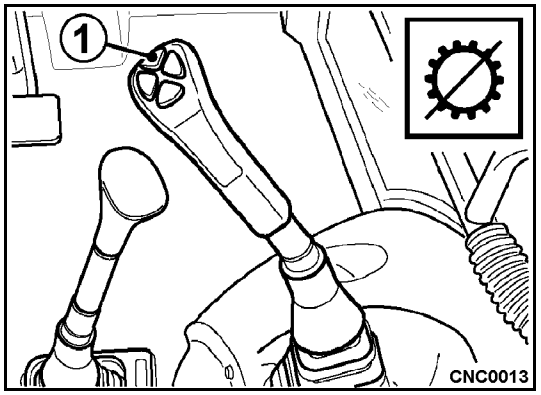
4 Bucket close button

5 Front end loader speed control button



LOADER DECLUTCH CONTROL BUTTON

This button (1) allows the operator the option of transferring all engine power from the drive line to the loader hydraulics when lifting heavy loads.This feature should only be used on level ground.

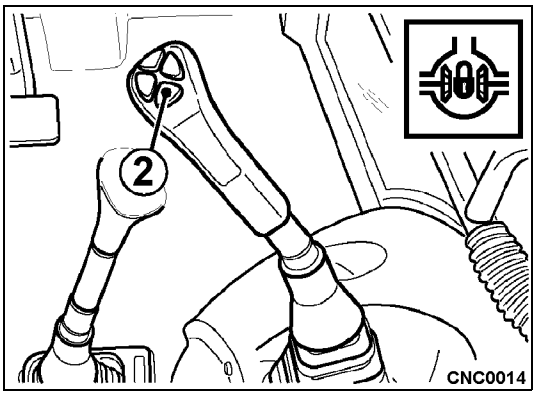


WARNING

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

DIFFERENTIAL LOCK BUTTON

This button (2) allows the operator the option of locking the drive wheels together when operating in 1st. 2nd. or 3rd. gear. It is used when there is wheel spinning or when loading the bucket in slippery locations.



WARNING

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

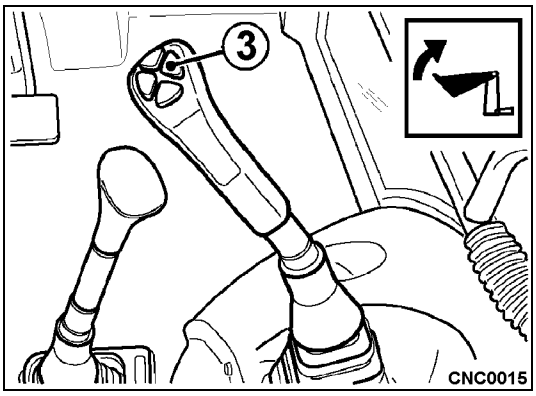
Remark

This function does not work in 4th. gear range. Before engaging this feature be sure the machine is stopped or traveling at a slow speed.

BUCKET OPEN BUTTON

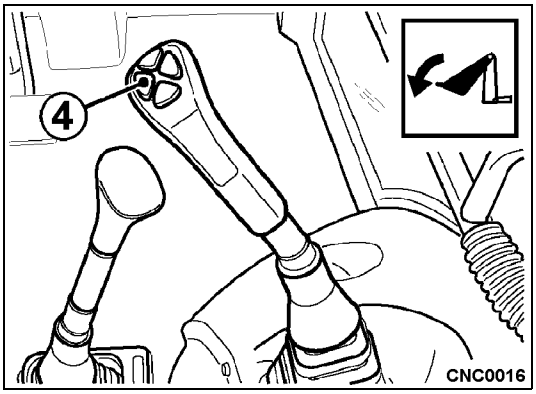
On machines equipped with the multipurpose bucket, this button (3) opens the top half of the bucket allowing the operator the option of converting the loader bucket into a dozer blade when filling in trenches. Or using the bucket for picking up items.

See MULTIPURPOSE BUCKET on page 5-6



BUCKET CLOSE BUTTON

On machines equipped with the multipurpose bucket, this button (4) closes the top half of the bucket allowing the operator to use the bucket for scoop and loading operations.

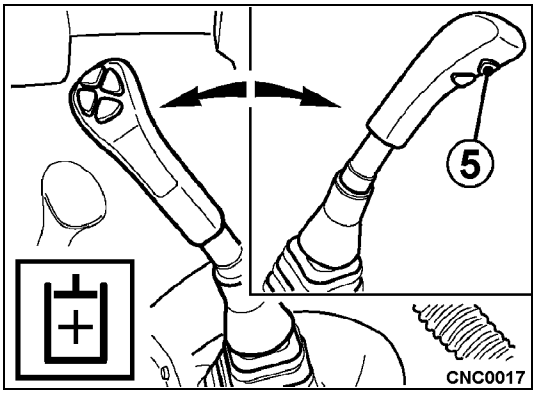


FRONT END LOADER SPEED CONTROL BUTTON

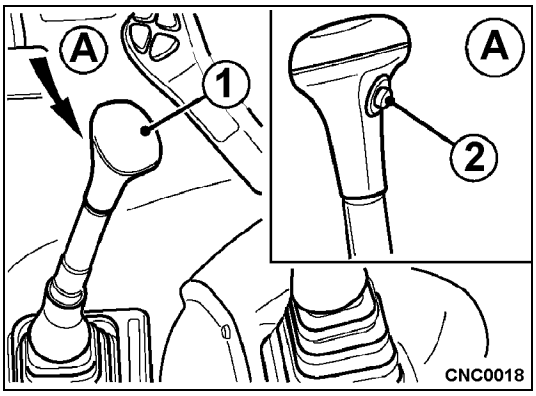
When button (5) is activated, it makes it possible to utilize the maximum oil delivery from the hydraulic pump. Pressing this button allows the operator extra power to the loader system.

Remark

It is advisable to use this feature for no more than 5 to 6 seconds during loader operation.



GEAR SHIFT LEVER CONTROLS



The gear shift lever (1) is used to change travel speed ranges. it is equipped with a declutching button (2) which is used to disengage the drive line for changing speed ranges.

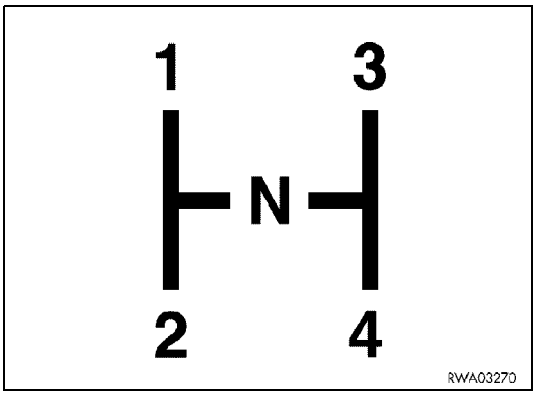
⚠ WARNING

- **Engage the gears only with the engine running at a low RPM and the machine is traveling slowly or stopped.**
- **Avoid up-shifting when using the machine in heavy operations.**
- **Always shift the lever into a neutral position (N) when parking the machine and set the parking brake.**

DECLUTCH BUTTON

To change speed ranges, slow the machine down, press the declutch button (2) and shift to the desired speed range, release the declutch button as quick as possible.

CHANGING SPEED RANGES

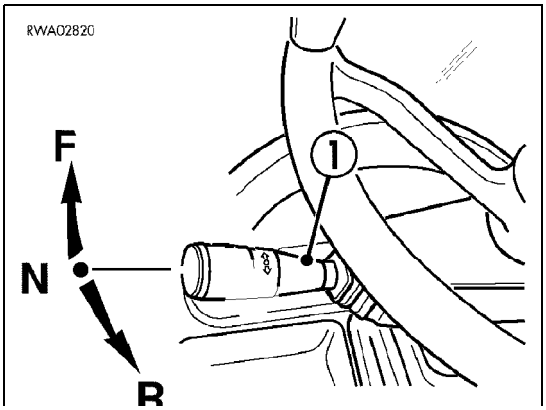


The machine is equipped with four speed ranges. The lower speed ranges are for using the front end loader or slow maneuvering on a job site. The higher ranges are for forward ground or road travel.

⚠ WARNING

3rd. and 4th. speed ranges are for forward operation only. Do not travel in reverse using the 3rd. or 4th. speed range. Loss of control may result.

DIRECTIONAL CONTROL LEVER



When operating in a desired speed range shown above you can choose a forward or reverse direction by simply using the directional control lever (1). This function allows you to change direction quickly and easily without using any type of clutching mechanism.

To operate, lift the lever and move it into any direction:

F- Forward travel.
N- Neutral.
R- Reverse travel.

Remark

The machine can only be started in the (N) neutral position. When parking the machine, shift into the (N) position and set the parking brake for safety. Avoid changing direction when traveling at fast speeds, always slow down and apply the brakes before changing direction.

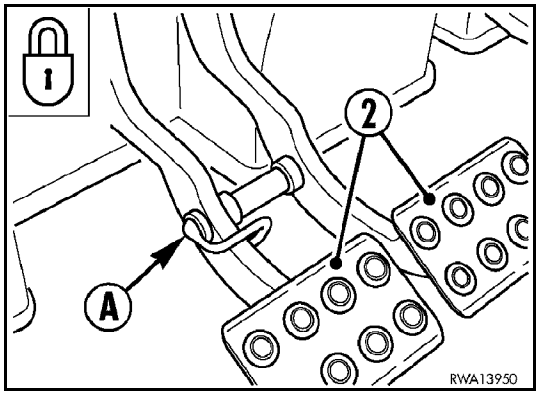
BRAKES, PARKING BRAKE, ACCELERATOR AND THROTTLE CONTROL

BRAKE PEDALS

The machine is equipped with a tandem brake pedal set-up. This set-up makes to possible to separate the right and left braking system for making sharp tight turns right or left in close working conditions.

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 at the right or left wheel
.

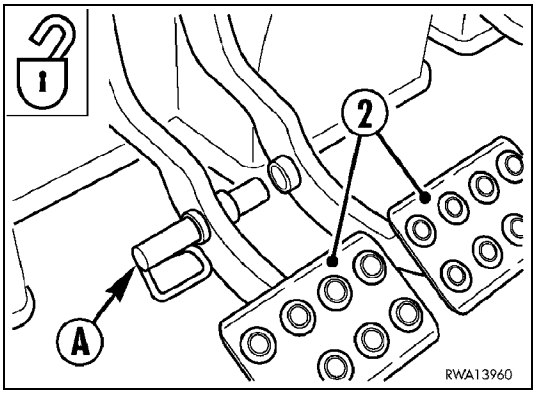


WARNING

When operating with the brakes separated or unlocked:

- **Always operate at a slow speed no higher than 1st gear.**
- **Never operate the machine at high speeds with the pedals unlocked.**
- **Once you are finished with your operations, always relock the brake pedals immediately for safety purposes.**

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

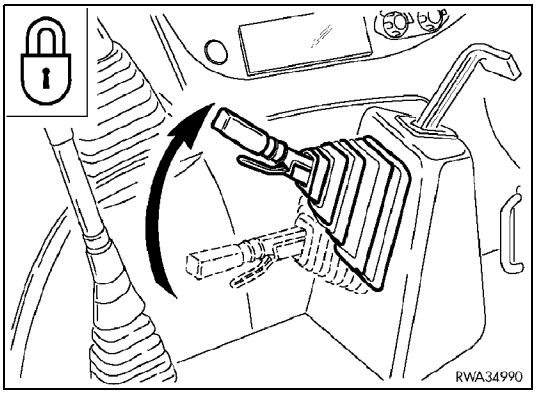


PARKING BRAKE

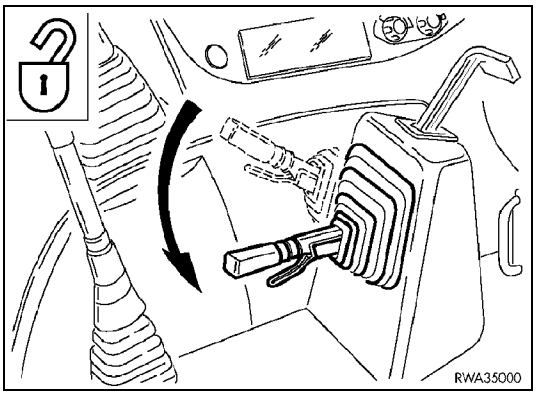
When exiting the cab it is important that the parking brake be applied. To set the parking brake, bring the machine to a full stop, grasp the brake handle firmly and squeeze the lock lever below the brake handle, pull up on the handle until the brake handle locks in place, then release the lock lever. The brake set indicator will come on indicating the brake is set.

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, the parking brake must be used. 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 set indicator will go off indicating the brakes are released.

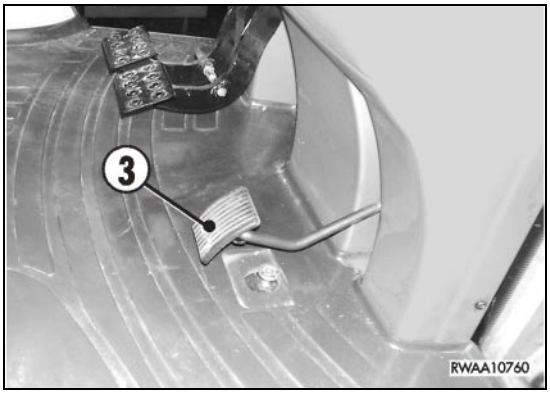


Remark

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

ACCELERATOR PEDAL

The accelerator pedal (3) is used mainly for road travel or when using the front end loader. When using the front end loader with the accelerator pedal, be careful not to strain the machine. Always accelerate smoothly when loading the front end loader.

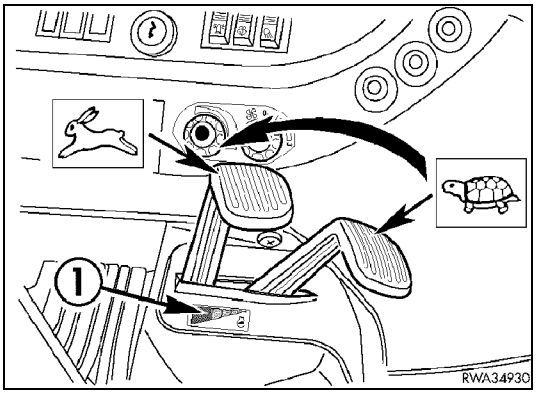


HAND THROTTLE

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

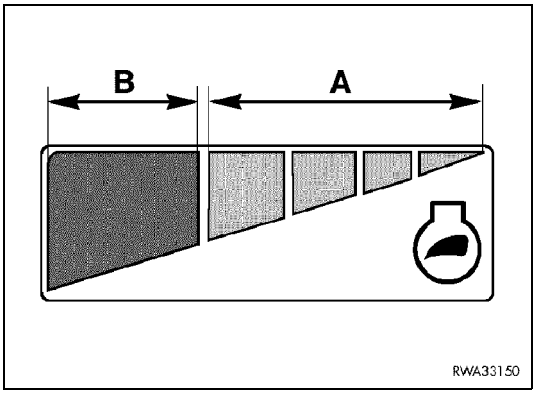
Idling Position: Throttle handle pulled forward.

Maximum RPM Position: Throttle handled pulled back.



Throttle Operating Tips

Avoid using the machine with the throttle lever completely in the maximum RPM position. Fuel consumption and engine ware will be increased at high engine speeds. 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 1700 RPM which is the value recommended for normal operation.
- **Red area "B"**: This area indicates the engine speed is in the range of 1900 RPM which is the maximum speed allowed for the use of the backhoe.

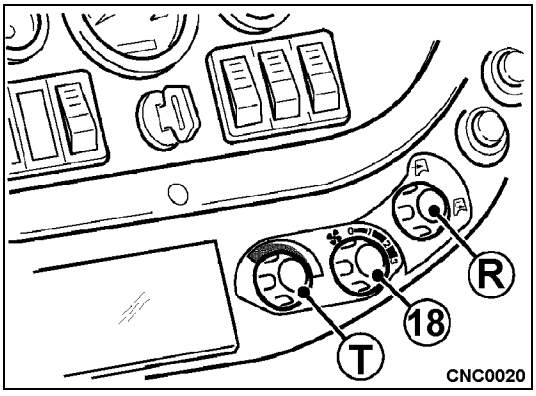
Remark

Throttle speed can be monitored using the tachometer on the side instrument bezel.

CAB ENVIRONMENT AND SAFETY EQUIPMENT

Ventilating, cooling and heating the cab serve to reduce operator discomfort in cold or hot environments. If your machine is equipped with a cab this system serves to reduce condensation on cab windows and uncomfortable temperature conditions.

HEATING AND VENTILATION SYSTEM

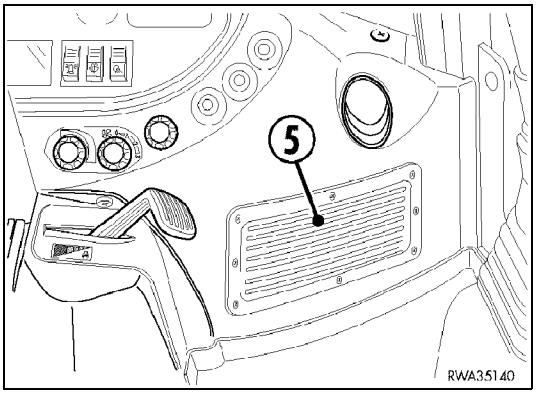


AIR CONDITIONING

If your machine is equipped with air conditioning, besides the air conditioning switch (16) and blower control switch (18) you will have two other controls.

These controls are (T) for temperature control and (R) for re-circulate. To control temperature (T) simply turn the knob clockwise to increase temperature and counter-clockwise to decrease temperature. To regulate air supply (R) turn knob clockwise to re-circulate inside cab air and counter-clockwise to allow outside air in. Feature (R) is so the cab can be warmed up or cooled down rapidly.

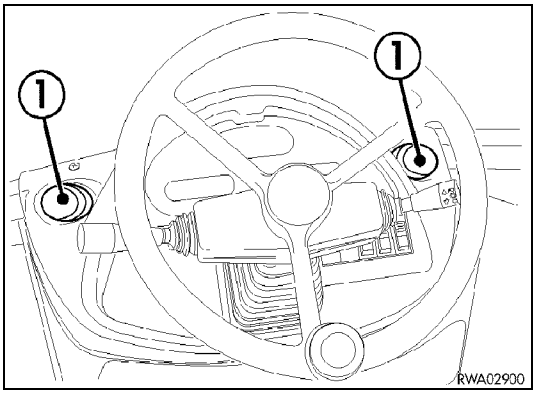
HEATING SYSTEM

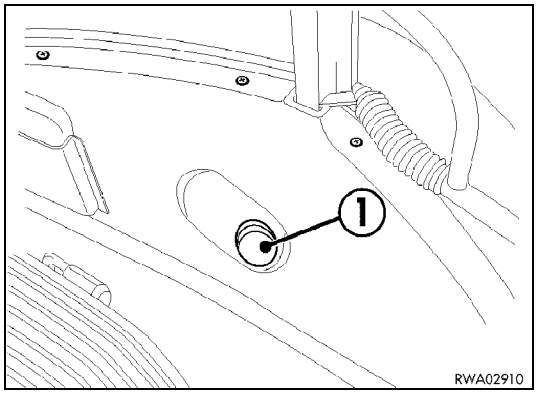


If your machine does not have the optional air conditioning it will still have the temperature control switch (T) and the blower control switch.To control temperature (T) simply turn the knob clockwise to increase temperature and counter-clockwise to decrease temperature.

Inside cab air is picked up through vent (5) and circulated past the heater core. Vents (1) supply the rear and front of the cab.

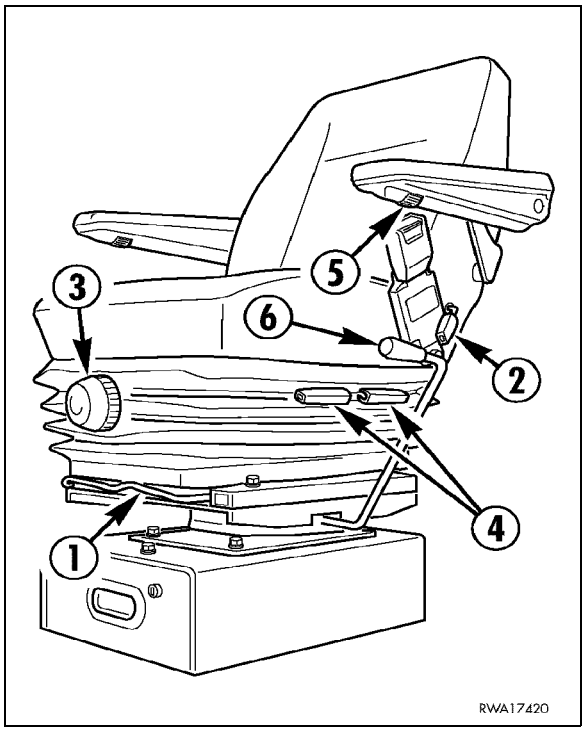
Front And Side Air Supply Vents (1)





SEAT AND SEAT BELT

SEAT



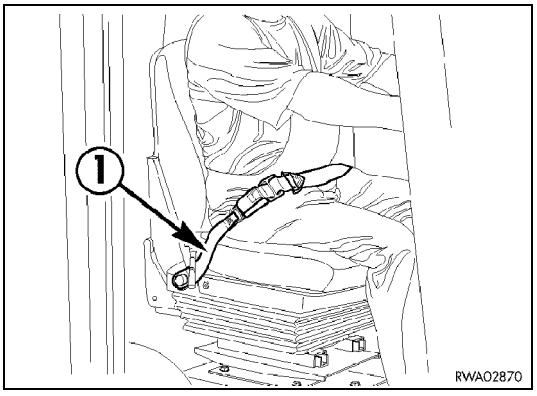
The seat is designed for maximum operator comfort which helps reduce operator fatigue. There are six adjustments with the seat.

They are:

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

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 counter-clockwise. 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.

The purpose of the seat belt is to keep the operator in the seat if the machine should be involved in a rollover situation. Before starting the engine or doing anything in the cab fasten the seat belt snuggle around your waist first.

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 should occur. Getting in the habit of using the seat belt could save your life.

Remark

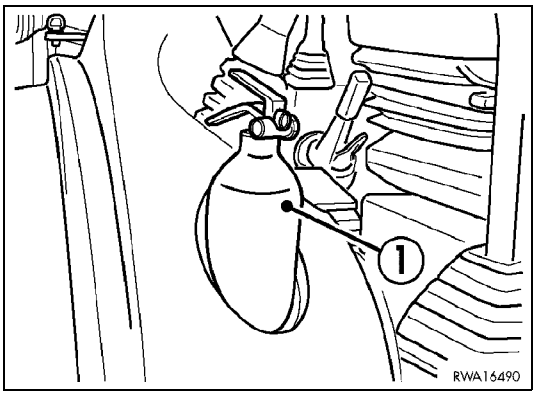
The seat belt must be replaced every 4 years due to fatigue.

SAFETY EQUIPMENT AND STORAGE AREAS

FIRE EXTINGUISHER

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

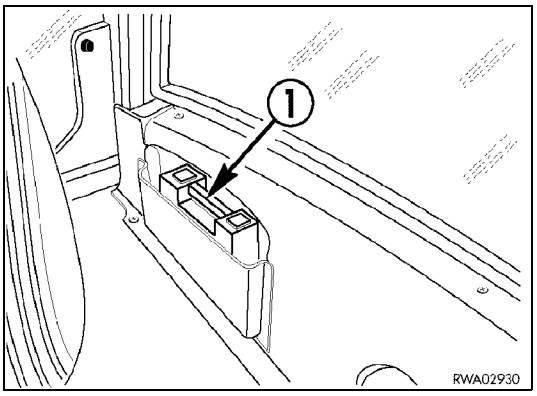
If you equip your machine with a fire extinguisher, learn how to use it and where it is stored. Before starting any work operations always check the fire extinguisher to be sure it is charged and in good condition.



FIRST AID KIT

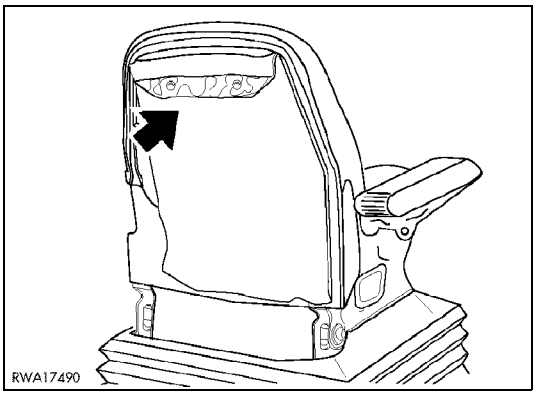
The machine owner must provide a first aid kit for the machine. There is a storage area (1) provided in the cab to hold the first aid kit.

It is important to periodically check the first aid kit to be sure it is in good condition and the medical supplies are not damaged or missing.



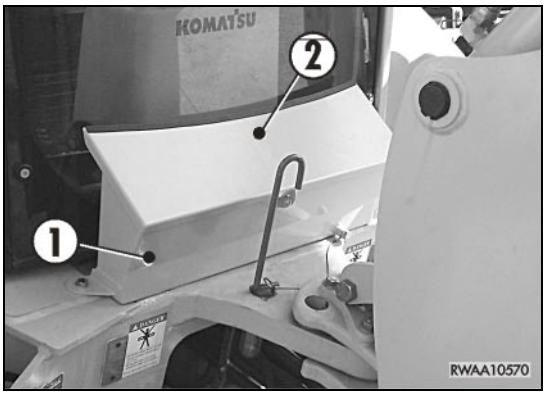
DOCUMENT STORAGE

This area is provided for the storage of any service documents. It is also for storing of the service manual which must be kept with the machine at all times for quick reference by the operator.



TOOL CASE

This location is for storing extra tools if needed. When using the tool case (1) be sure the cover (2) is closed firmly to prevent tools from falling out and getting caught in the work equipment.



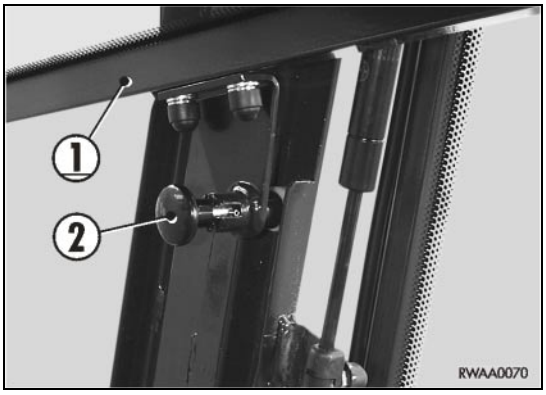
CAB AND GUARDS

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

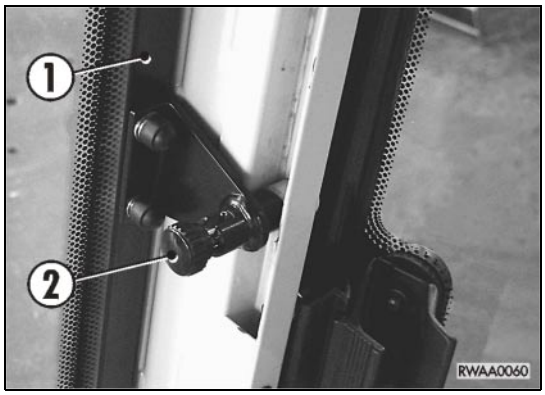
DOORS AND WINDOWS

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 during operation.



The rear cab doors (1) can be operated only after releasing the couplings (2), by pulling and lifting the window itself.

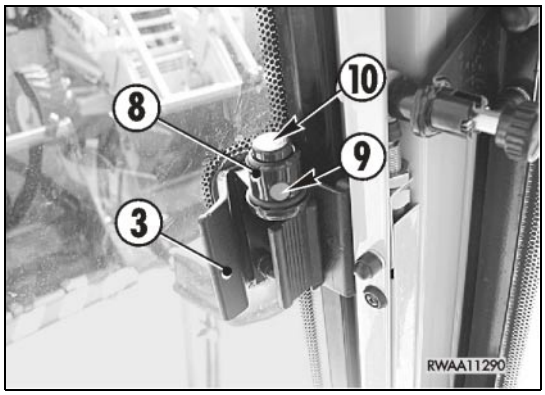
Once the window has been positioned, the bayonet joints (2) must be fitted into the upper safety couplings.



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

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

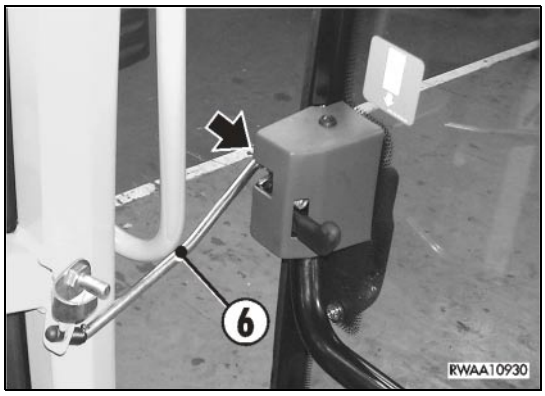
When closing the side window, always engage safety lock (8) by pressing button (10)



Remark

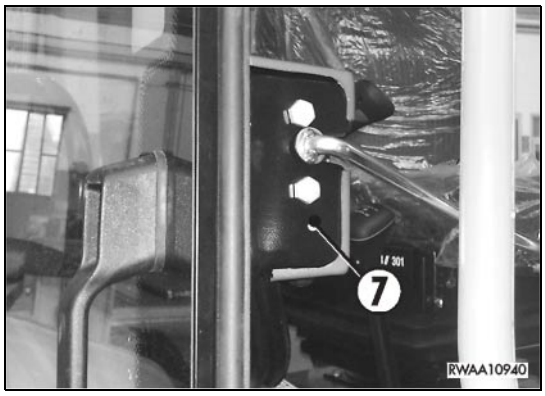
The side window must always be secured in the open position with the locks (5) or they must remain closed. When the windows are closed, always secure them with the safety device block (8). Periodically lubricate the elastic locks (5) with the specified grease.

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



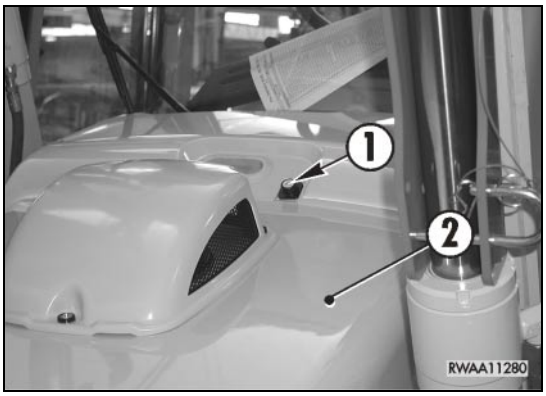
Remark

The doors must always be secured with the locking device (6) or remain closed.



ENGINE HOOD

After releasing the lock (1) button positioned on top of the hood (2), the hood can be opened. 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.**
- **When doing maintenance with the front end loader raised, be sure to engage the safety lock in the loader arm.**
- **Always lower the loader completely to the ground when opening the hood.**

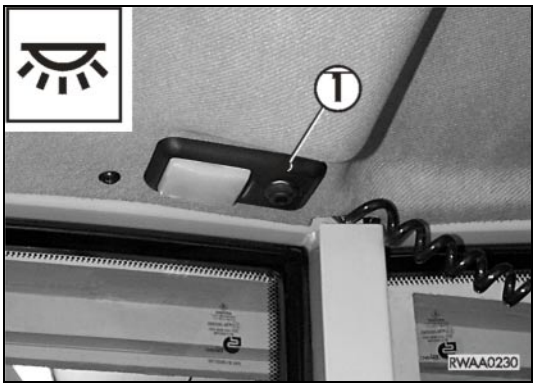
ELECTRICAL

This machine is controlled by a series of electrical components, switches, relays, systems etc. It is important to know where the system shut-down and electrical protection systems are located if extra security is needed or if an electrical system should fail.

SWITCHES AND EXTRA ACCESSORIES

OVERHEAD LAMP

The overhead lamp is for checking items in the cab when operating the machine at night or when visibility is poor.

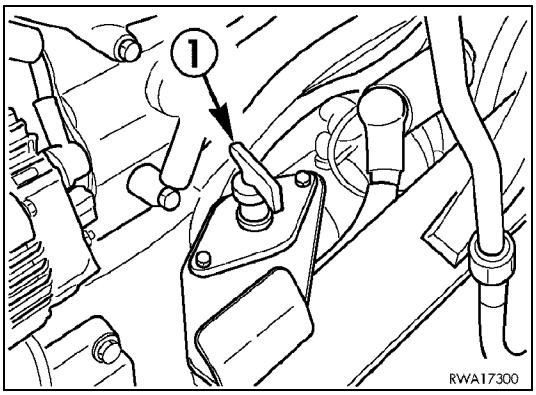


BATTERY DISCONNECT

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

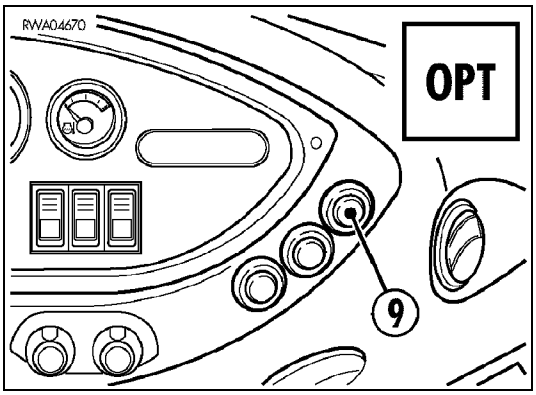
To use this feature, Open the engine hood, locate the switch on the left side of the frame near the starter motor. Rotate the switch counter clockwise to disconnect the electrical system.

To re-connect the electrical system, rotate the switch clockwise.



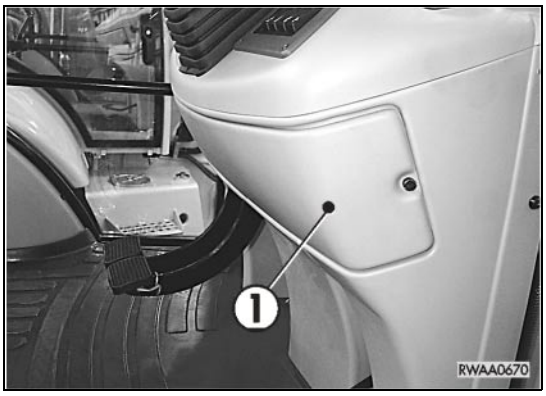
OPTIONAL ELECTRICAL SWITCH LOCATION

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



FUSES AND RELAYS

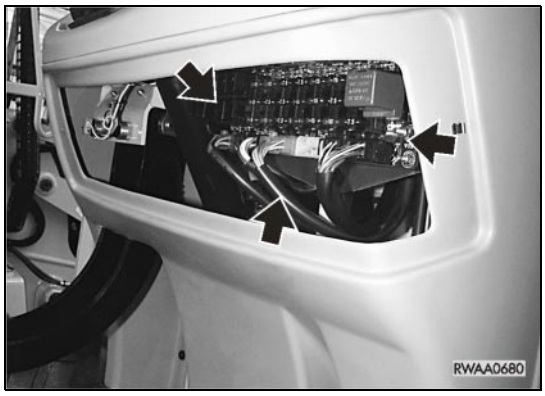
FUSE AND RELAY PANEL LOCATION



The fuses and relays are grounded on a single base positioned inside the front dashboard below the steering wheel and to the right of the instrument bezel. Removing cover (1) exposes the fuses and relays if service should be required.

If an electrical system should fail during operation it is important to check the fuses or relays first. Each fuse bank is set-up with a red LED indicator to alert the operator or service personnel of the blown fuse in a particular bank.

The relay bank is also set-up with a yellow LED indicator to alert the operator or service personnel of a non-functioning relay.



Once cover (1) is removed the fuses and relays are easily assessable. With the ignition key in the “ON” position look and see which LED is on. This will indicate which bank of fuses or relays have failed.

To replace a fuse or relay the ignition switch must be in the “OFF” position.

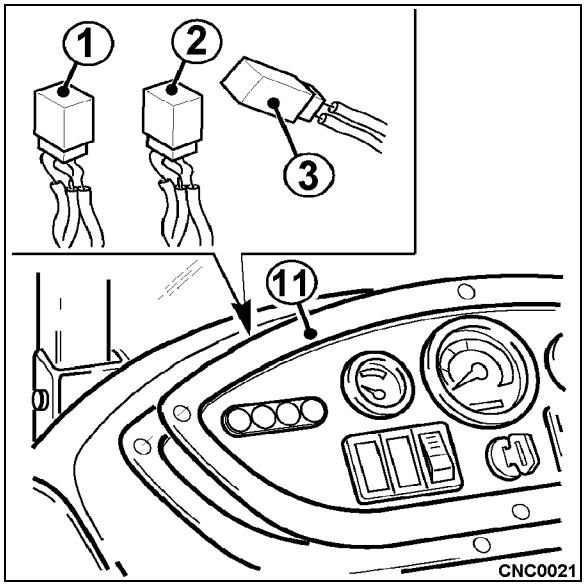
Remark

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.

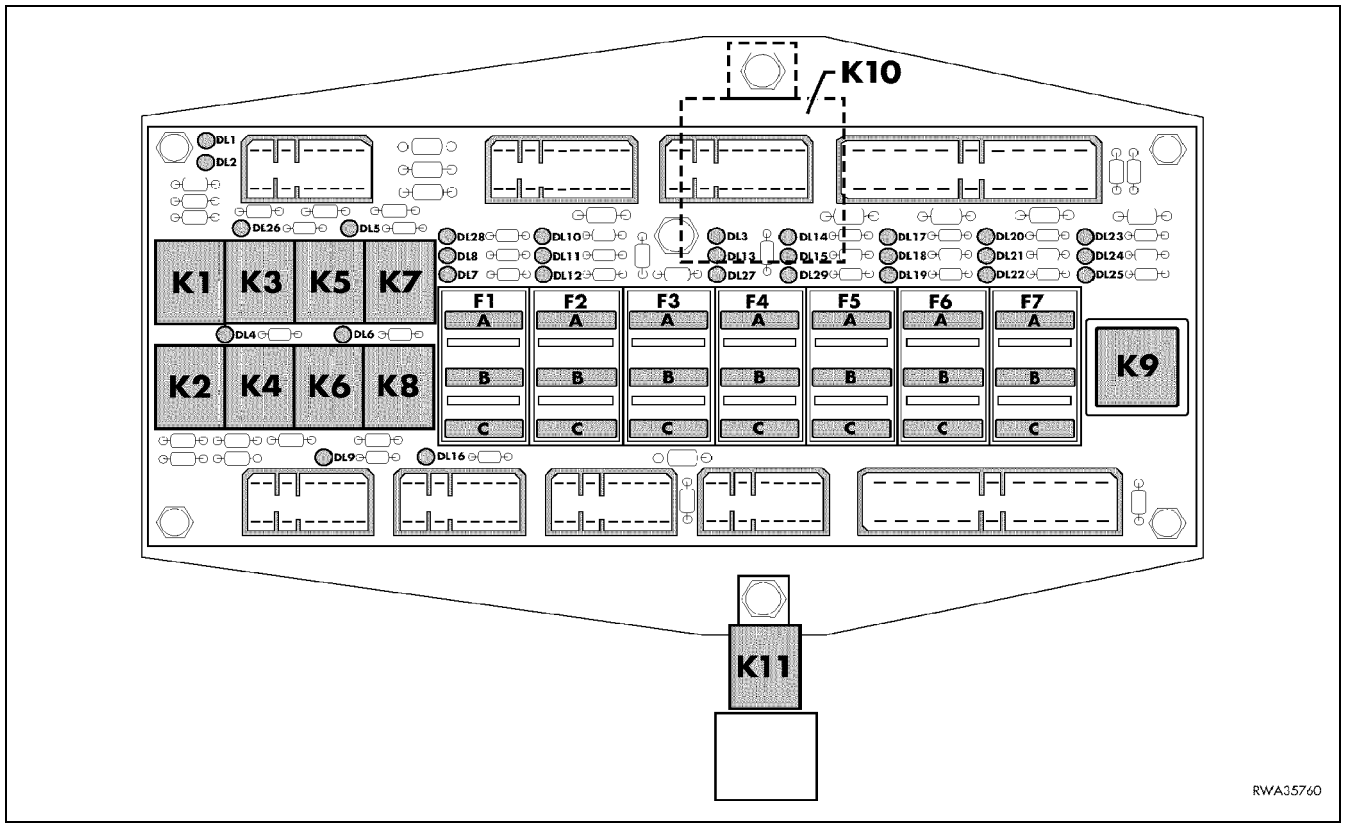
DASHBOARD RELAY LOCATION

The relay positions (1,2 and 3) are located behind the instrument bezel in the dashboard above the fuse panel. To access these relays, the instrument bezel (11) must be removed to access.

Position	Description
1.	Blower relay (if equipped)
2.	Air conditioning relay (if equipped)
3.	Return-to-dig relay (front end loader)



FUSE AND RELAY PANEL LAY OUT

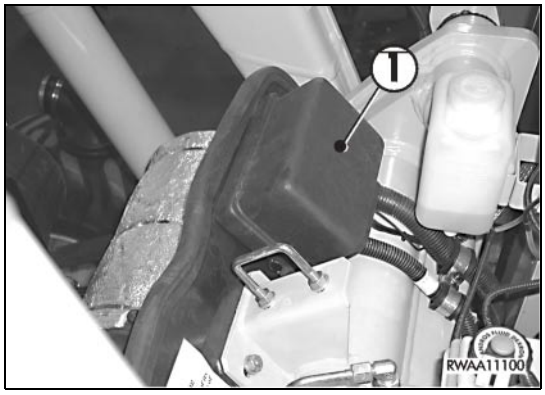


Fuse Position		Color	Capacity (Amps)	(Red) LED	Circuit Involved With Blown Fuse
F1	A	Light blue	15	DL25	Low beam
	B	Violet	3	DL8	Right rear and left front parking light
	C	Violet	3	DL7	Left rear and right front parking light
F2	A	Red	10	DL10	Cigarette lighter
	B	Brown	7.5	DL11	Cab overhead lamp and radio
	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

Relay Position	(Yellow) LED	Circuit Involved With Inoperable Relay
K1	DL1	Forward gear relay
K2	DL2	Reverse gear relay
K3	DL26	Four-wheel drive relay
K4	DL4	—
K5	DL9	Low beam relay
K6	DL16	High beam relay
K7	DL5	Direction selector power supply relay
K8	DL6	Horn relay
K9	—	Blink relay
K10	—	Flasher
K11	—	Fourth gear signaling relay

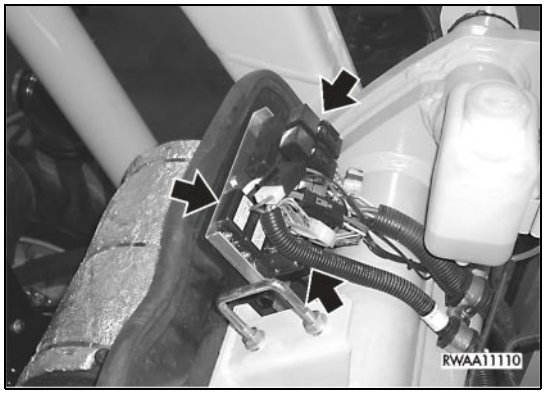
ENGINE FUSE AND RELAY LOCATION

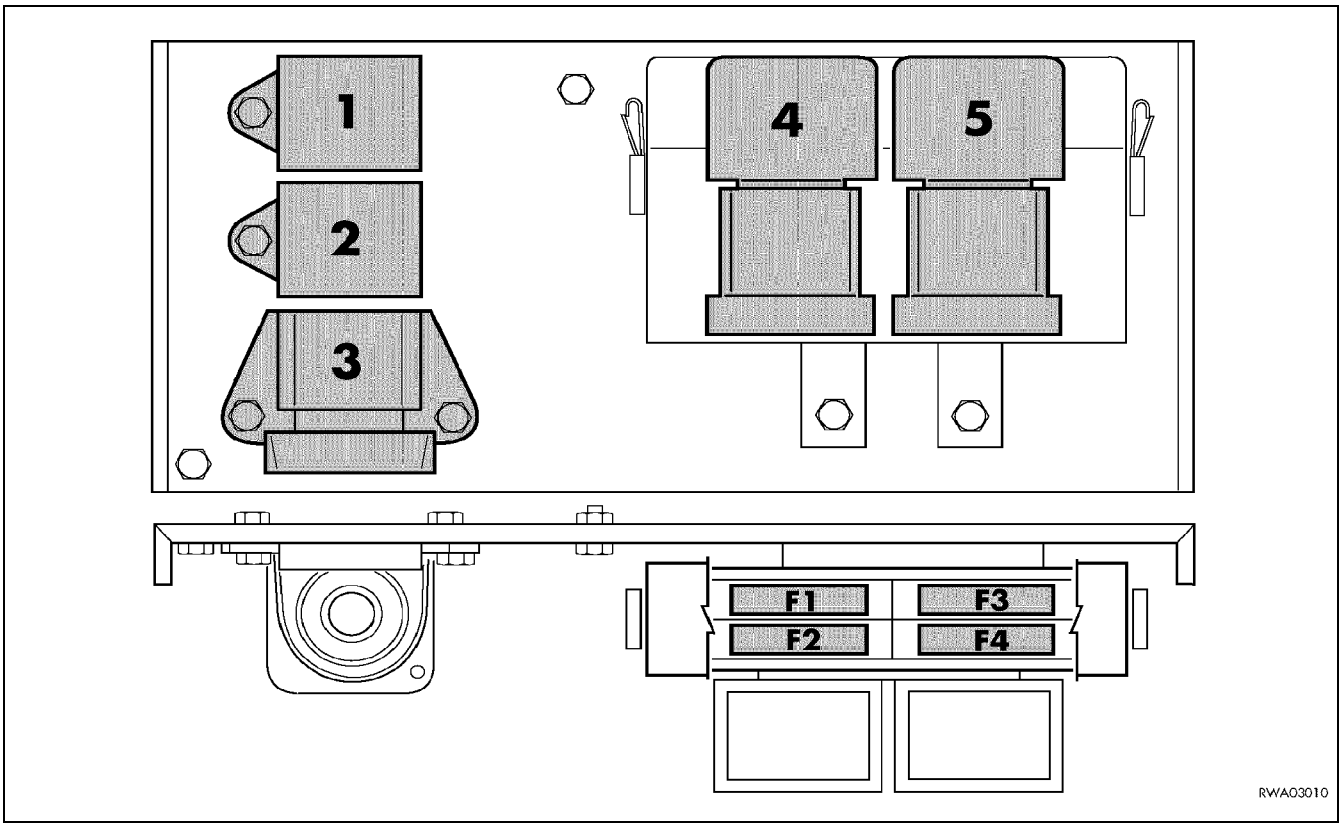
The fuses and relays for the engine electrical system are grouped in one fuse panel located inside the engine compartment. They are protected with a plastic cover. Removing cover (1) exposes the fuses and relays if service should be required.



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.





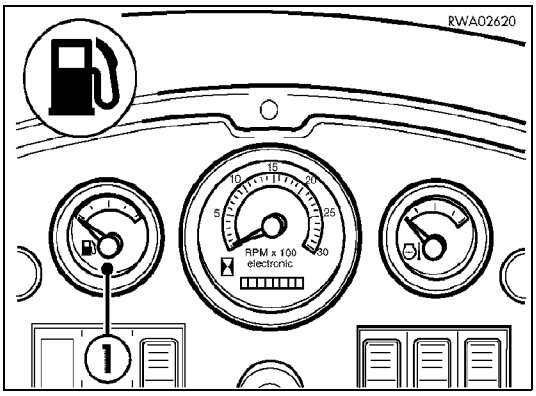
Fuse Position	Color	Capacity (Amps)	Circuit Involved With Blown Fuse
F1	White	80	Glow plug preheat
F2	Green	30	Engine stop
F3	Blue	60	Engine start
F4	White	80	Alternator

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 your 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: See "PRECAUTIONS BEFORE STARTING WORK OPERATIONS" on page 1-8 before proceeding with any work operations.

CHECKING THE FUEL SUPPLY

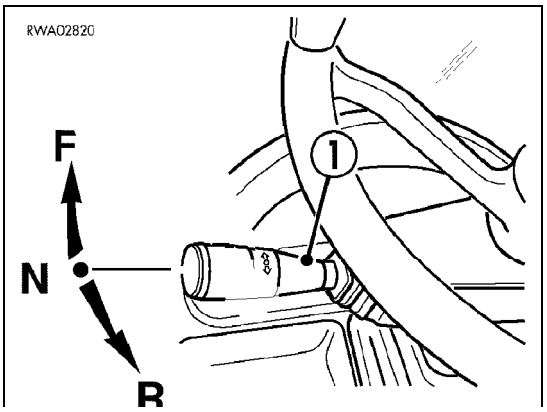


Before starting the machine it is important to be sure there is enough fuel in the fuel tank. To check, turn the ignition key to the "ON" position and read the fuel gauge (1).

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. these may damage fuel pump and injector parts.

STARTING THE ENGINE



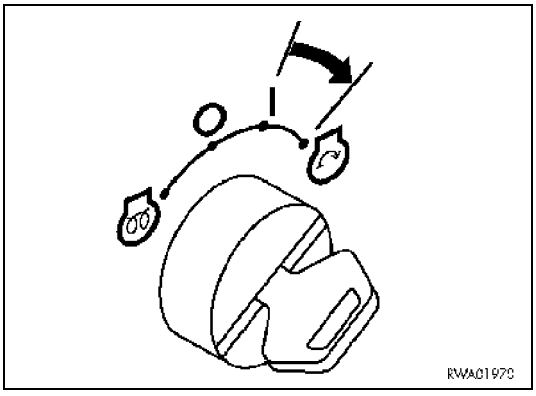
Before starting the engine be sure all personnel are clear of your work area or travel path. To start the engine:

Be sure the directional control lever (1) is in a neutral (**N**) position. The engine will not start with the directional control lever in a forward or reverse position.

Be sure the throttle control lever is set at a low idle speed.

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 will return to the "**I**" position automatically



With the engine now running, check all the gauges and warning indicators. Be sure the system is operating normal and you allow the engine and hydraulic system time to warm up before starting work.

Remark

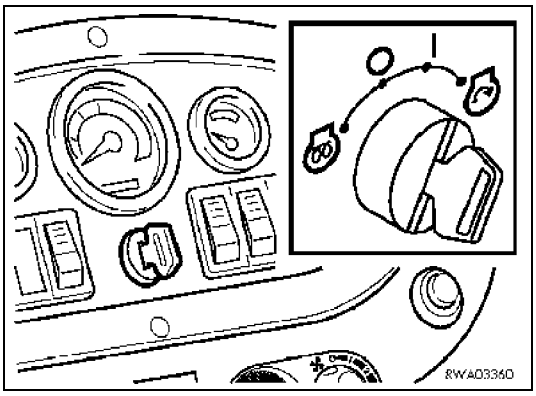
If the engine does not start within 15 seconds, release the ignition switch and wait for 30 seconds before trying again. If it will not start, do not continue to crank the engine, damage to the starter may result. Contact your Komatsu Dealer for repairs.

STARTING THE ENGINE IN COLD WEATHER

WARNING

Do not use any starting fluids or ether based product to aid in the starting of the engine. These products may cause explosion, damaging the engine or causing injury.

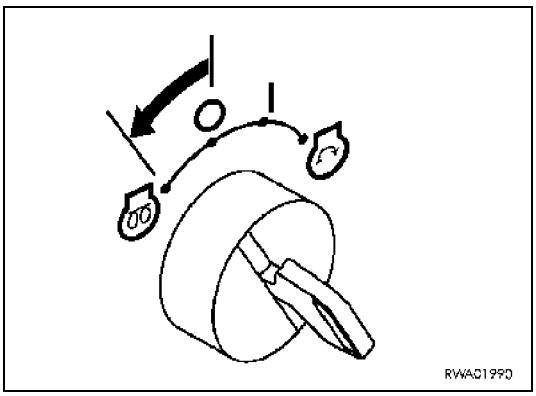
To start the engine in cold weather or in extremely cold climates, the following procedures should be used:



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

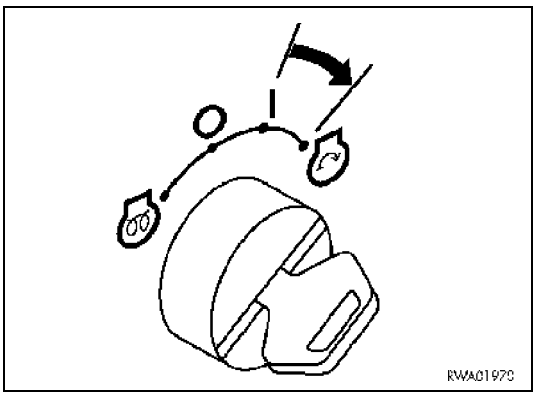
Be sure the throttle control is set at a low idle speed.

Turn the key to the preheat position. The preheat time is determined by the outside temperatures.

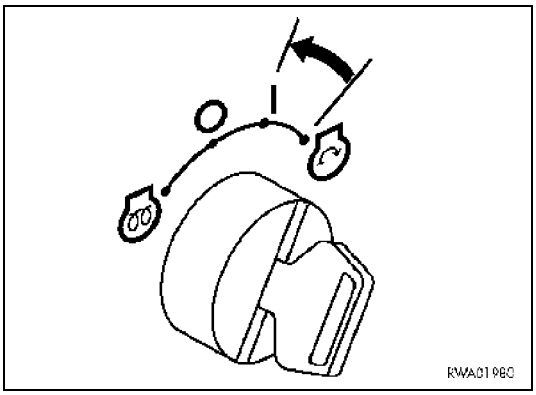


Once the preheat indicator goes out you are ready to crank the engine.

With the accelerator depressed half way, or fully depressed in extremely cold weather, crank the engine until it starts. Do not pump the accelerator pedal.



When the engine starts, release the key and accelerator pedal, the switch will return to the "**I**" position automatically

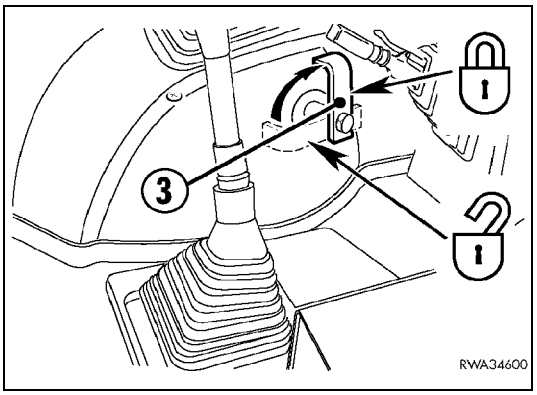


With the engine now running, check all the gauges and warning indicators. Be sure the system is operating normal and you allow the engine and hydraulic system time to warm up before starting work.

Remark

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

WARMING THE MACHINE UP



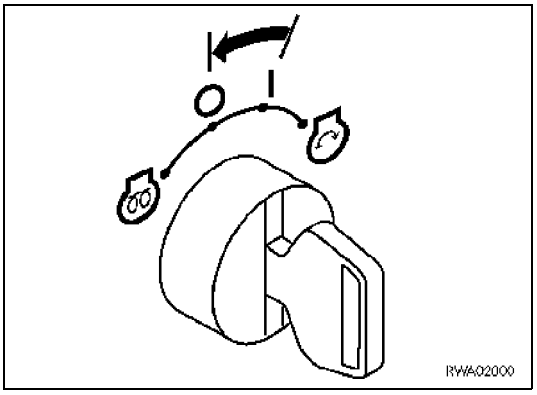
When warming the engine especially in cold weather it is advisable to also warm up the hydraulic system oil. Always allow an ample amount of time to warm the machine up. Starting work operations with a cold machine causes excess and necessary ware on parts. To warm the engine and hydraulic system up:

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

Remark

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

SHUTTING THE ENGINE DOWN



After operating the machine it is recommended you allow the engine to idle at a low RPM for a short period of time to cool the system down. To shut the engine down, proceed as follows:

- Lower all work equipment to the ground.
- Shift the directional control lever into the neutral position.
- Set the throttle at a low idle position.
- Set the parking brake.See “PARKING THE MACHINE” on page 2-50.
- Turn the ignition switch to the “OFF” position and remove the key.

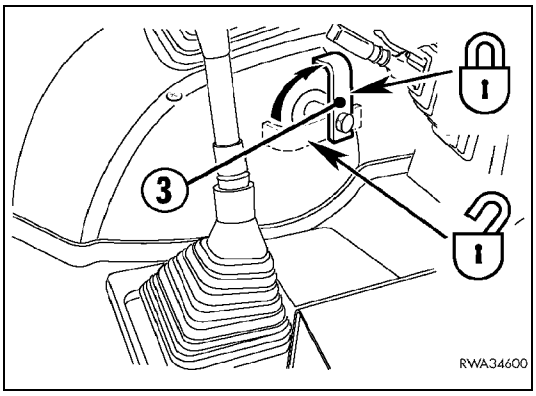
Remark

Never shut the engine down at a high RPM always allow the engine time to idle and cool down before shutting down.

OPERATING THE FRONT END LOADER AND BACKHOE

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

OPERATING THE FRONT END LOADER



Before using front end loader (4) be sure front end loader lock (3) is unlocked. When operating the front end loader you must be seated in the operator's seat with the seat belt fastened firmly around your waist. Be sure both outriggers are up and locked. Be sure the backhoe unit is locked and pined. See "BACKHOE LOCKS" on page 2-46. Check your work area to be sure no personnel are near you. Sound your horn before beginning work operations.

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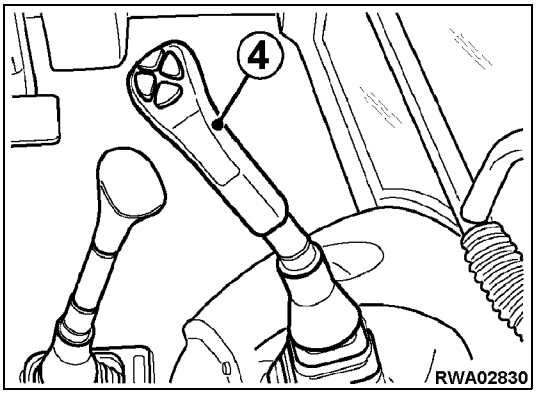
⚠ WARNING

When operating the front end loader:

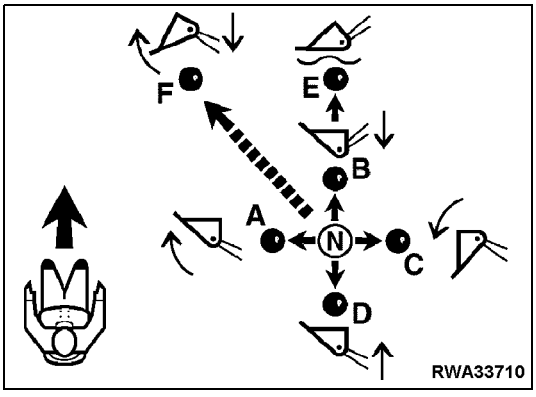
- **Always keep the bucket as close to the ground as possible.**
- **Never raise or lower the bucket while traveling, always come to a complete stop when raising or lowering the loader bucket.**
- **Avoid lowering the bucket too quickly, damage to the lift arm cylinders may result.**
- **When traveling 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.**



CONTROL LEVER POSITIONS

Loader Bucket and Arm Operations

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.

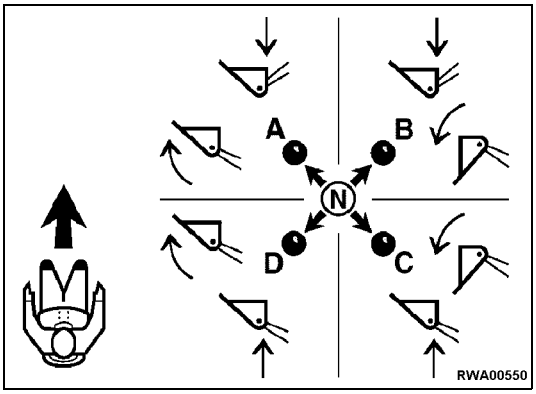


N - Neutral position (no boom or bucket movement)
A - Bucket curl back
B - Arm lower
C - Bucket dump
D - Arm raise
E - Arm in free float position
F - Self leveling (return to dig)

Dual Functional Bucket and 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.

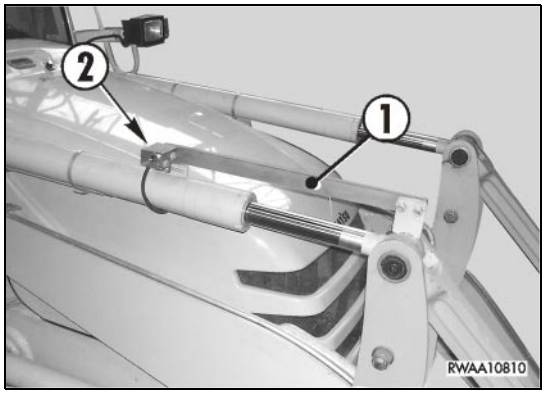
PERFORMING LOADING OPERATIONS

Before performing loading operations the operator must become familiar with the loader controls and its positions. The operator must also be familiar with all 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

The machine is equipped with an automatic (RETURN-TO-DIG) feature which determines the horizontal position of the bucket in relation to the ground. This position is reached when sensor (2) no longer detects rod (1) position.

For adjusting rod (1): See "ADJUSTING AUTOMATIC RETURN OF FRONT BUCKET TO THE DIGGING POSITION" on page 3-64.

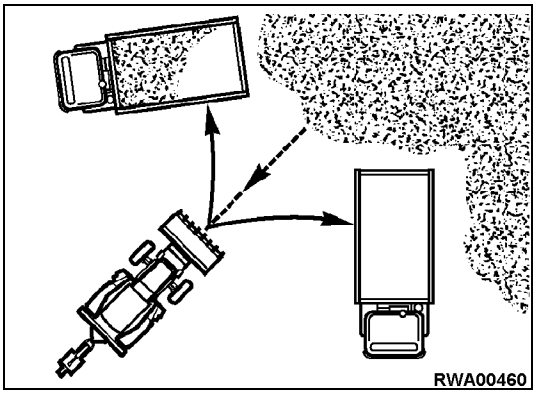


ORGANIZING YOUR WORK AREA

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 loading pattern you will be using. The illustration gives an example of a simple loading pattern used by most operators.

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.



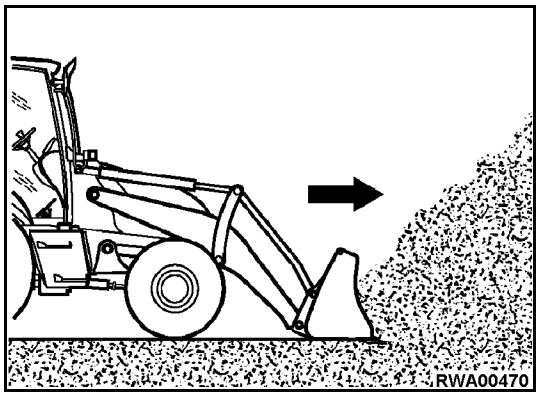
Remark

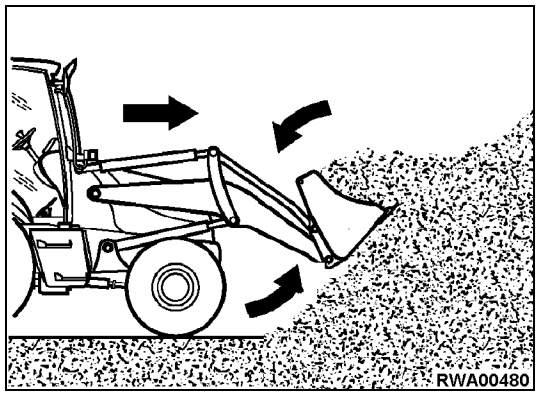
When using the declutch button during loader operations always bring the machine to a full stop before changing speed ranges.

LOADING HEAPED MATERIAL

The efficiency of loading the bucket depends on how the operator starts the loading process:

1. Level the bucket and set it on the ground. Shift into a lower speed range.
2. Start moving into the pile at several feet away.
3. Once the bucket is into the pile, begin curling the bucket back while continuing to head into the pile. This will keep the material from falling under the front of the bucket thus losing part of your load.
4. Once the bucket is full, stop moving into the pile and begin rasing the load while continuing to curl the bucket back.
5. Raise the arm enough to allow the material in the bucket to fall toward the back of the bucket and level off.
6. Lower the bucket back down to approximately 50 cm (20 in) above the ground and back out of the pile of material.
7. Proceed slowly and cautiously toward your point of deposit for the load.



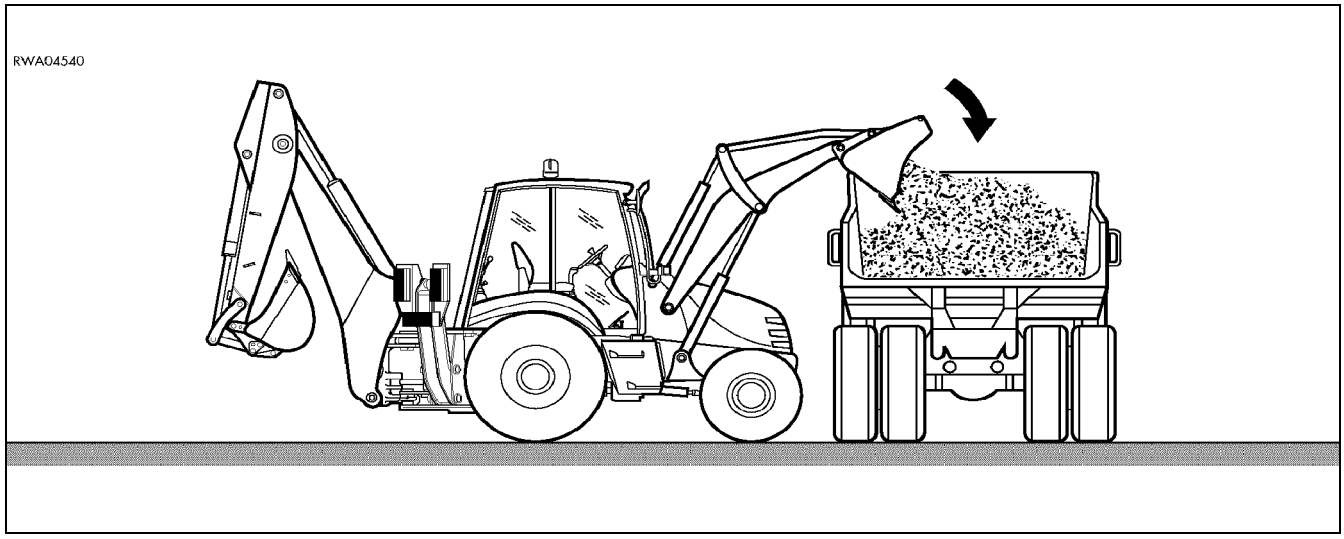


⚠ WARNING

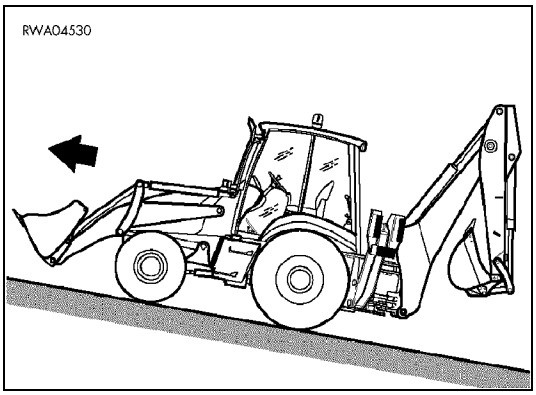
Always travel with the load as close to the ground as possible. Remember the higher you go with the load, the higher it forces the center of gravity on the machine, this makes your machine unstable and prone to a rollover situation. Always take corners slowly and cautiously. Never raise the load while traveling.

LOADING A TRUCK BED OR TRAILER

When loading a truck bed or trailer always start your loading toward the front of the bed. Approach the truck or trailer slow and cautiously keeping the load as close to the ground as possible and the front end of the machine parallel with the truck or trailer. Once you are at your point of deposit, stop, raise the load and move toward the truck or trailer slowly. Once you are over the center of the bed, deposit your load, back up far enough to clear the truck or trailer and lower your empty bucket.



WORKING ON SLOPES WITH A LOADED BUCKET

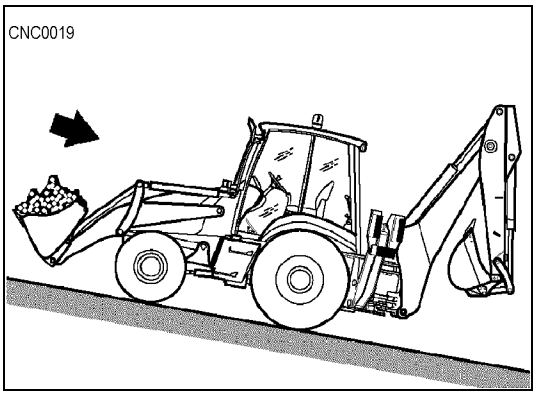


Working on a slope can be dangerous if safety and some basic precautions are not observed. Below is a list of some basic precautions that should be followed:

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 when traveling up or down slopes.

3. When traveling up the slope, the front loader bucket must always be directed toward the top of the incline.



4. When traveling down a slope with the bucket loaded, travel with the loaded bucket facing the top of the incline backing the machine down the incline.

5. Always keep the bucket at least 50 cm (20 in) above the ground. Never raise the bucket when traveling on a slope.

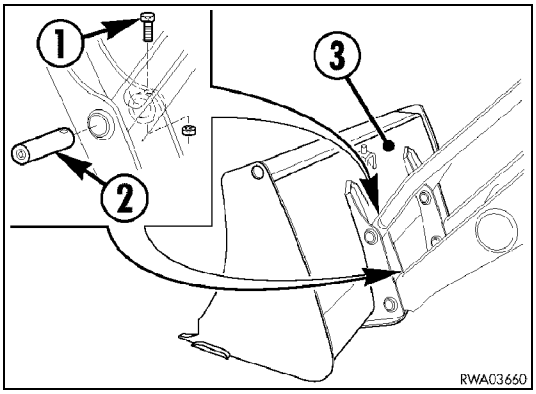
6. Never turn on a slope or travel at an angle on the slope.

7. Travel up or down the slope at a slow controllable speed.

Remark

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

CHANGING THE FRONT BUCKET



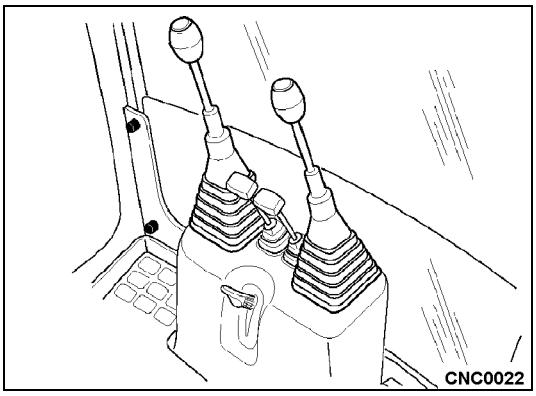
When changing front loader buckets always ware gloves and eye protection. To change the front bucket:

- Position the bucket and machine on level ground.
- Remove the bolts (1) and coupling pins (2).
- Exchange the bucket (3), taking care to completely clean the pins and bushings before installing them.
- Reinstall the bolts and tighten them in place.
- Lubricate all pin locations.

⚠ WARNING

Never use your fingers or hands to line up the pin or bolt holes. If hole alignment is not correct, use a steel drift to line up parts.

OPERATING THE BACKHOE

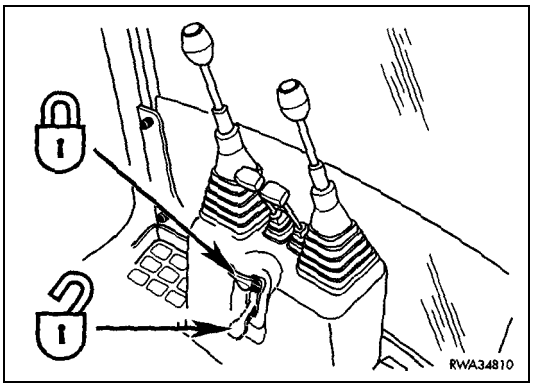


Before performing any backhoe operations the operator must become familiar with the backhoe controls and their positions. The operator must also be familiar with all safety involved when performing these operations. Failure to do so may result in damage to the machine or injury to the operator.

Remark

Remember the power in the backhoe unit 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 or possibly tip the machine over.

POSITIONING THE MACHINE



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

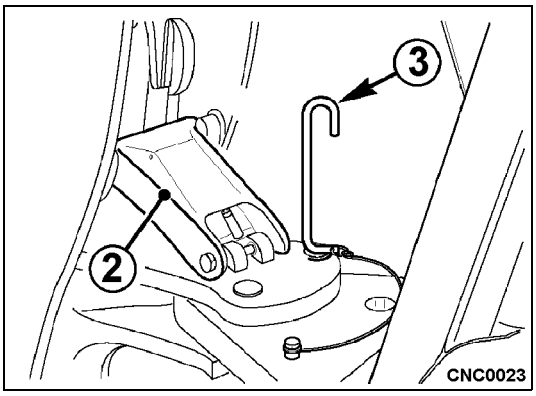
1. Rotate the seat around to the backhoe operating position and lock the seat in place. See “SEAT AND SEAT BELT” on page 2-22.

2. Remove outrigger locks and backhoe lock pin (3). Retract the backhoe locking (2) mechanism. See “SAFETY LOCK USAGE” on page 2-44.

3. Be sure your seat belt is fastened around your waist in a snug position.

4. Unlock the backhoe controls.

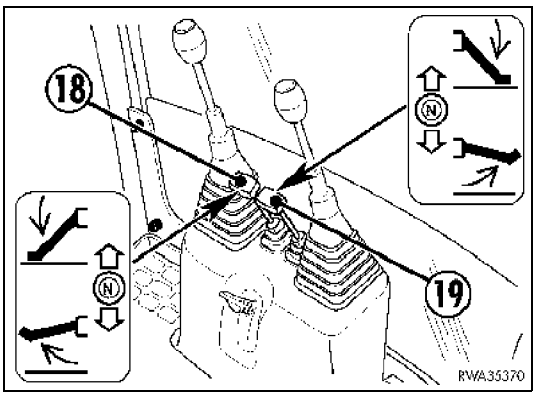
5. Be sure the machine directional control is set in a neutral position.

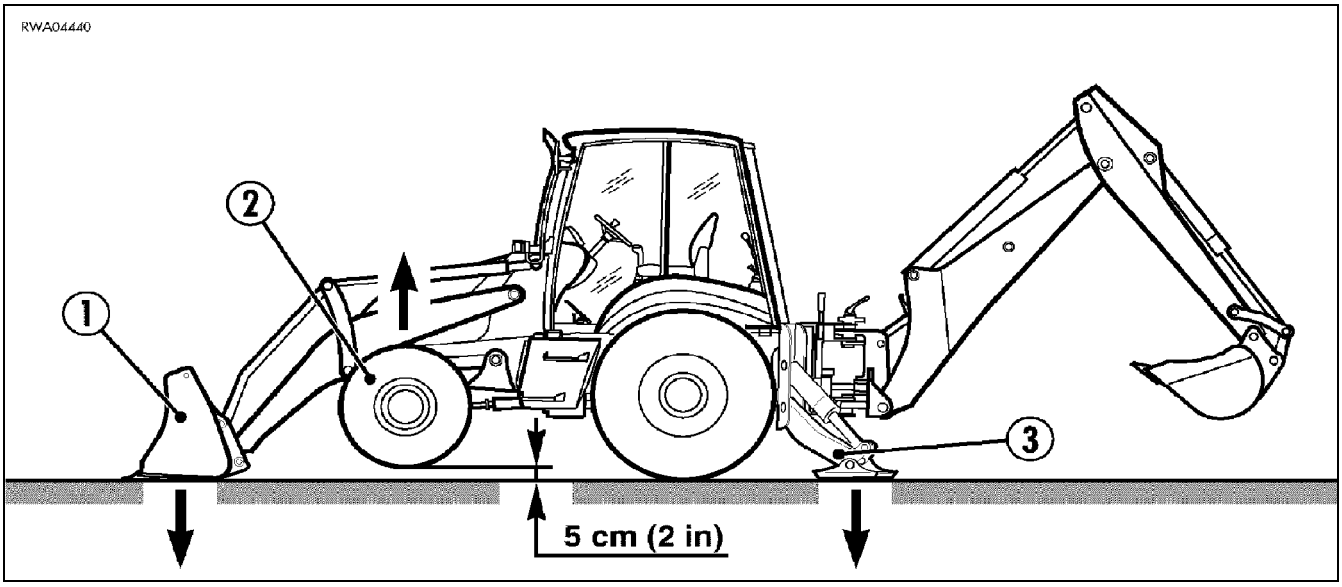


6. Lower both outriggers (18 and 19) at the same time lifting the machine evenly and squarely. Be sure both outriggers are completely extended together. Never operate the backhoe without lowering the outriggers and do not lower the outriggers one at a time.

Remark

When retracting the outriggers, bring both outriggers up slowly and at the same time, lowering the machine evenly and squarely back down.





7. Set the throttle at the proper RPM speed 1500 to 1600 RPM. See "BRAKES, PARKING BRAKE, ACCELERATOR AND THROTTLE CONTROL" on page 2-19.

8. 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.

9. 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.

10. When you are ready to start your excavation operations, sound the horn.

Remark

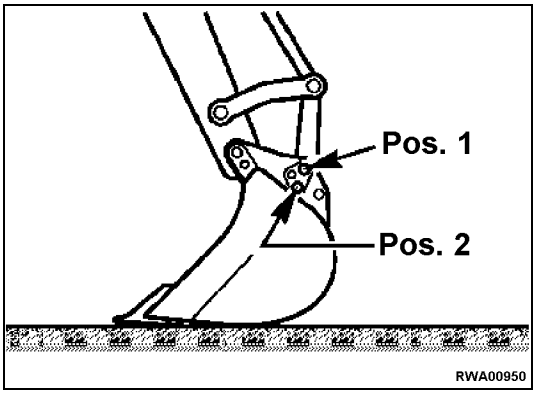
Call before you dig: See "STARTING YOUR WORK OPERATIONS" on page 1-9.

ADJUSTING THE DIGGING BUCKET

Depending upon what type of excavating operations you will be doing the digging bucket can be adjusted to a setting for two positions.

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.



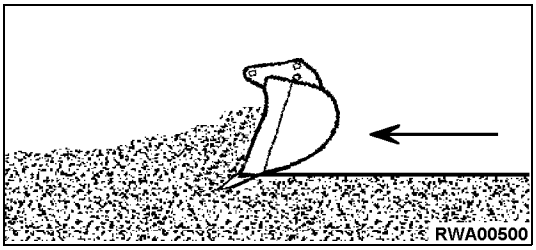
DIGGING METHODS

⚠ WARNING

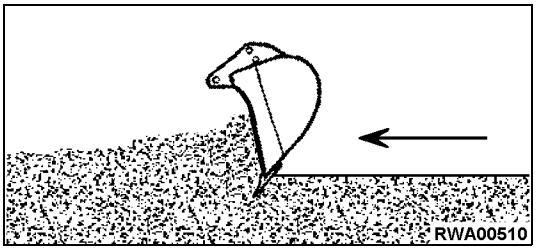
Be careful when excavating a deep trench, the machine is capable of excavating the surface underneath the outriggers thus causing the machine to fall into the excavated trench. Always be aware of this.

- To start, position the bucket at a slight penetration angle into the soil shown below in the first illustration on the left.
- Begin retracting the arm while raising the boom simultaneously. Take care not to lift the machine when performing this part of the operation. Keeping your bucket leading edge parallel with the surface being excavated.
- Once you are at the end of your stroke or 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 you are at a clear height, swing the boom to the right or left depending on your deposit point. Lower the boom and dump the full bucket extending or retracting the arm if needed.
- When excavating a trench at a depth shown in the illustration on the right, simultaneously retract the arm, raise the boom and curl the bucket keeping the leading edge of the bucket at a slight penetration angle into the soil but parallel with the surface being excavated.

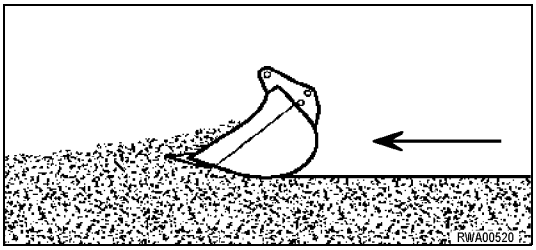
CORRECT
The bucket works best with its flat surface or cutting edge tipped down slightly but parallel to the ground.

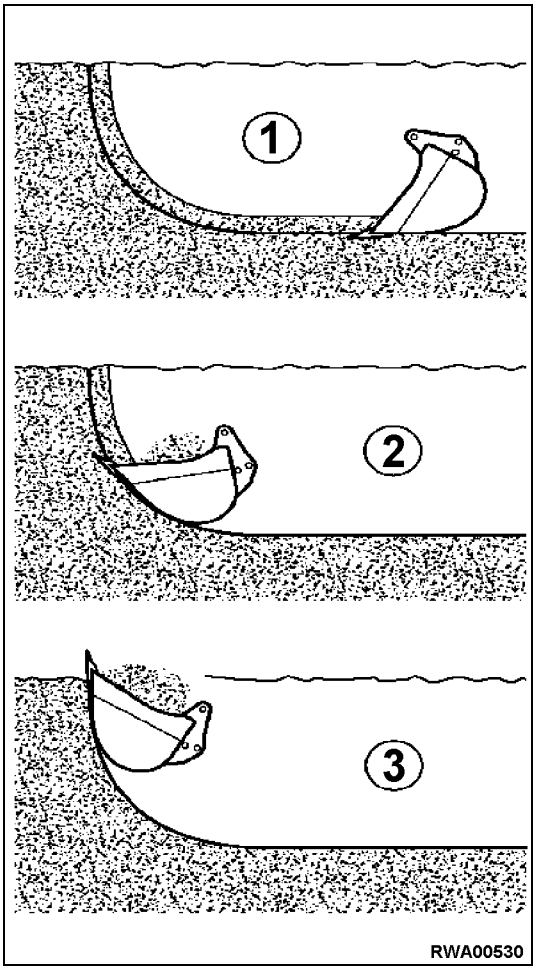


INCORRECT
The bucket is thrust downward reducing the breakout force and filling the bucket too quickly.



INCORRECT
The bucket is pushed upward, lifting the machine thus not filling the bucket.



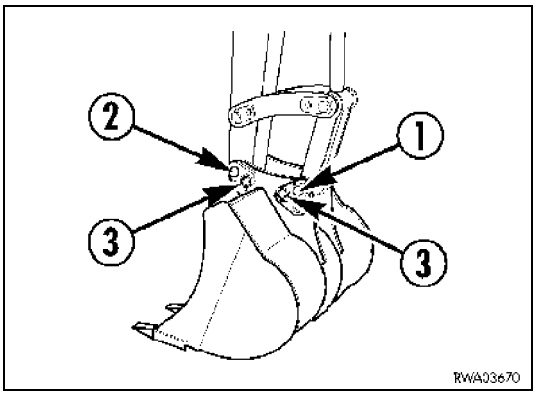


Sequence 1-2-3, shows the proper way to excavate a trench. Always keep the cutting edge of the bucket tipped down slightly but parallel with the surface being excavated.

CHANGING THE BACKHOE BUCKET

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

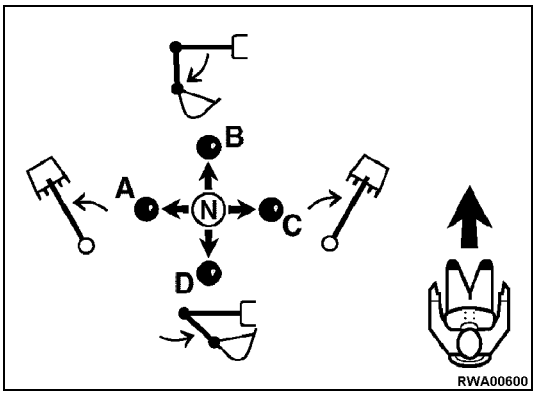
- Position the bucket and machine on level ground.
- Remove pin (1) and the arm connection pin (2).
- Exchange the bucket taking care to completely clean the pins and bushings before installing them.
- Reinstall the safety stop (3).
- Lubricate all pin locations.



WARNING

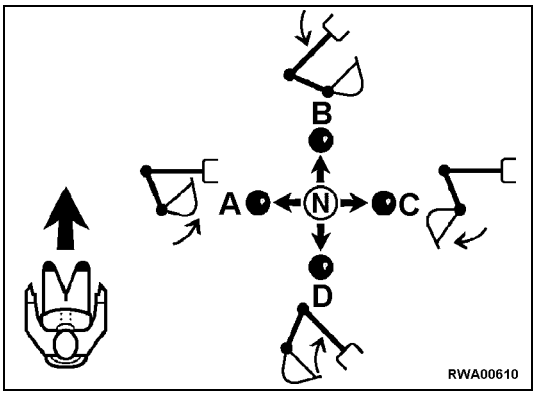
Never use your fingers or hands to line up the pin or bolt holes. If hole alignment is not correct, use a steel drift to line up parts.

ISO BACKHOE CONTROLS



Left Wobble Stick Control Lever (single)

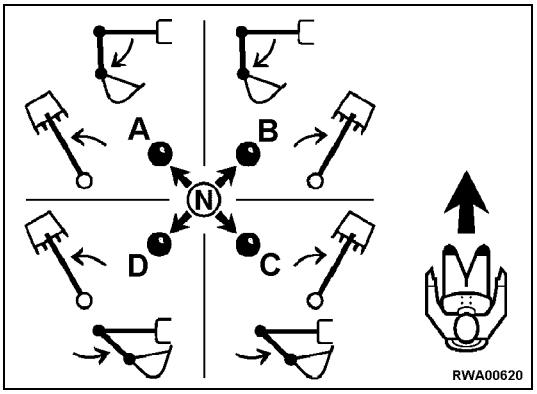
N - Neutral
A - Boom swing to the left
B - Arm extend
C - Boom swing to the right
D - Arm retract



Right Wobble Stick Control Lever (single)

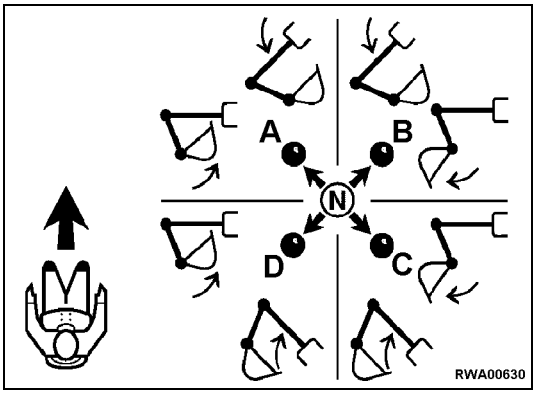
N - Neutral
A - Bucket curl
B - Boom lower
C - Bucket open
D - Boom raise

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

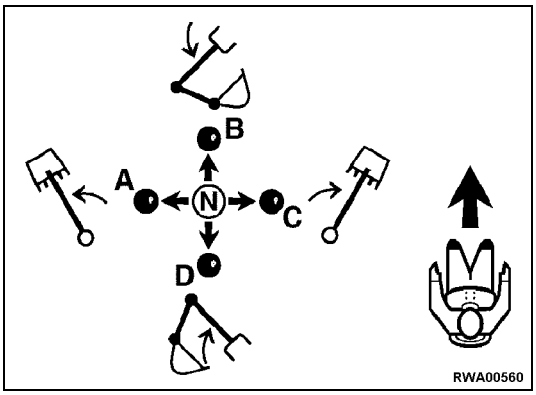


Right Wobble Stick Control Lever (combined)

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

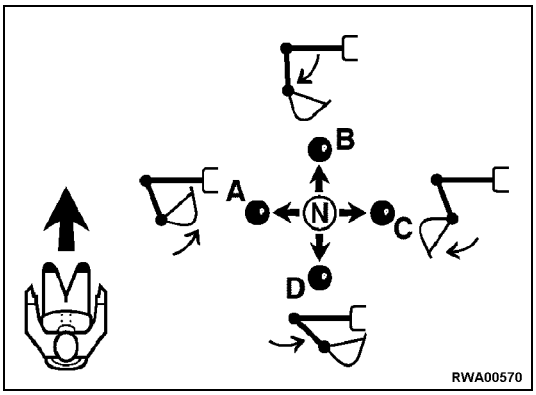
KOMATSU BACKHOE CONTROLS

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

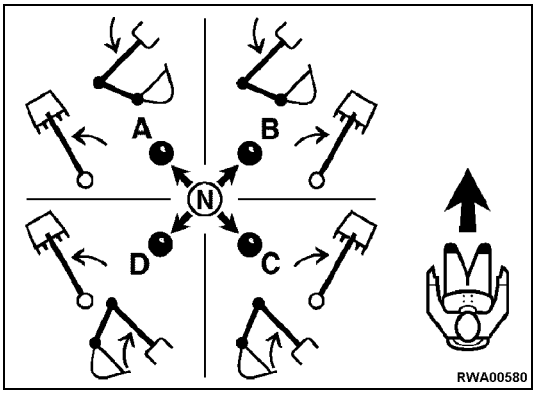
Right Wobble Stick Control Lever (single)



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

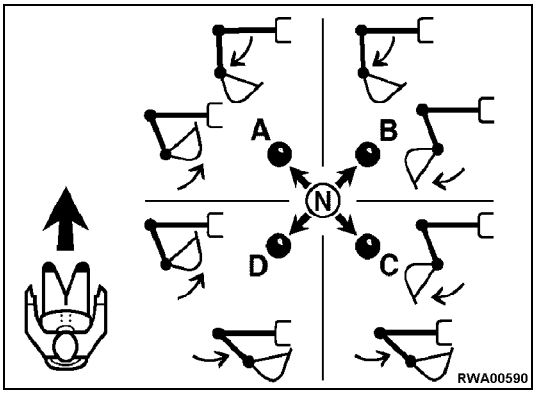
If the levers ar operated in directions that are toward the machine axis, simultaneous movements proportional to the angle of inclination are obtained, since the two hydraulic cylinders corresponding to each single function are activated at the same time.

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

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 equipped safety equipment may result in a serious accident or injury.

⚠ WARNING

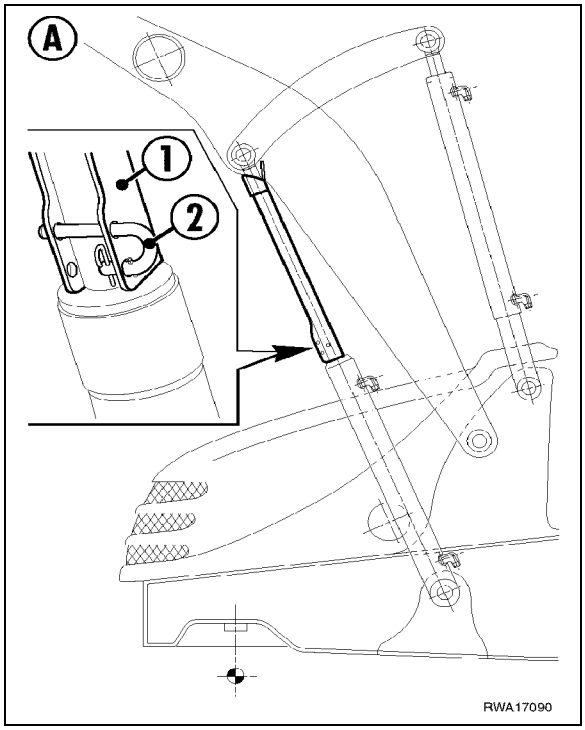
Safety locks should be used when:

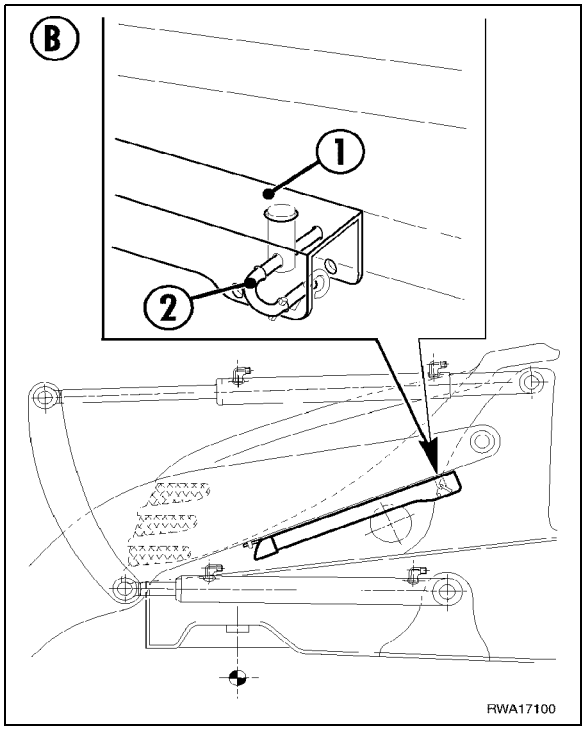
- **Performing any maintenance on the machine.**
- **When traveling on roads.**
- **When the machine will be unattended.**

FRONT END LOADER CYLINDER LOCK

In 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. In illustration (B) remove the cylinder lock assembly pin (2) holding on to 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), keeping the safety pin boss against the lift cylinder gland nut.
5. Insert the safety pin (2) completely into the pre-drilled holes and lock the pin 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 secularly in place before proceeding with any procedures under the front end loader.





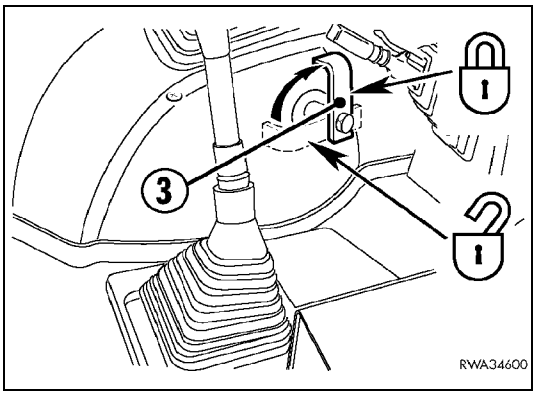
8. Using safety lock (3) in the operator's cab, lock the loader control before proceeding with any repair or service operations.

9. When your work is completed, unlock safety lock (3) in the operator's cab and 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 back down to the ground completely.

12. Re-install the cylinder safety lock (1) back in the storage location on the left lift arm shown in illustration (B)

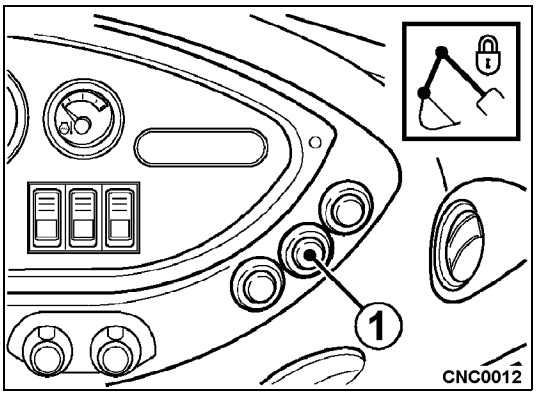


⚠ WARNING

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

BACKHOE LOCKS

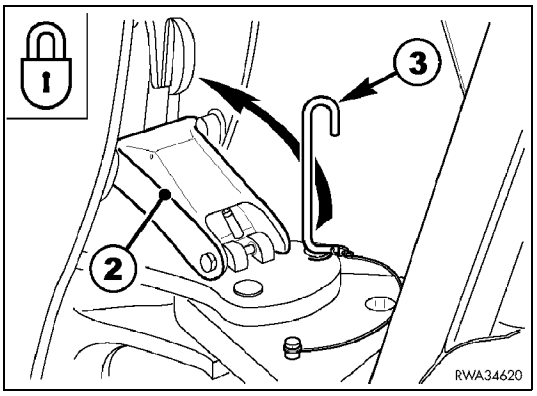
The backhoe locks are used to secure the backhoe unit in a travel position. These locks must be used when traveling with the machine or using the front end loader. To use the backhoe lock:



1. When the machine is in operation and the backhoe is being operated the boom lock for the backhoe should be disengaged.

2. To use the backhoe boom lock, locate the switch positioned on the left instrument bezel as viewed from the operator's position when operating the backhoe.

3. Fold the arm, boom and bucket up completely.

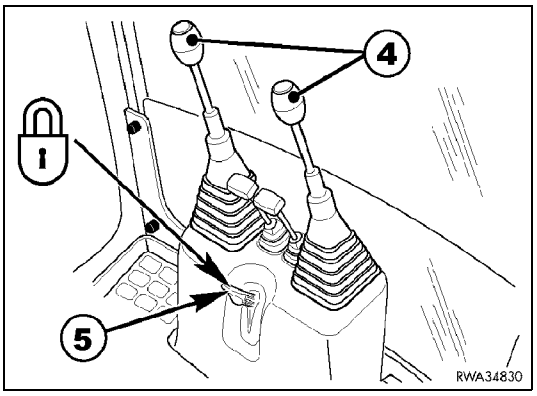


4. Once the arm, boom and bucket are folded up completely, press the boom lock switch (1) and engage the boom locking device (2).

5. Once the locking device (2) is set, 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.

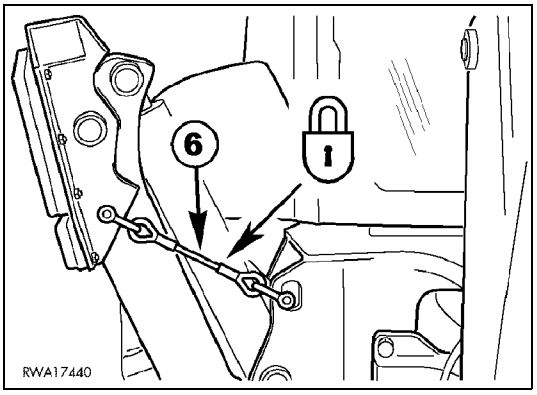
7. Be sure the pin (3) drops down completely and is flush with the top of the backhoe boss. Keep in mind once the lock pin (3) is installed the backhoe assembly will not swing



8. Once the pin (3) is in place, lock the backhoe wobble stick controllers (4) using the locking lever (5).

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

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



11. To lock the outriggers, retract both outriggers completely. The locking lever (5) must be unlocked to raise the outriggers.

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

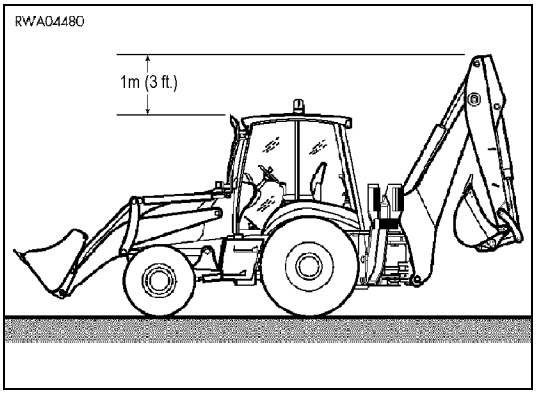
Remark

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

MOVING OR TRAVELING WITH THE MACHINE

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.

TRAVELING

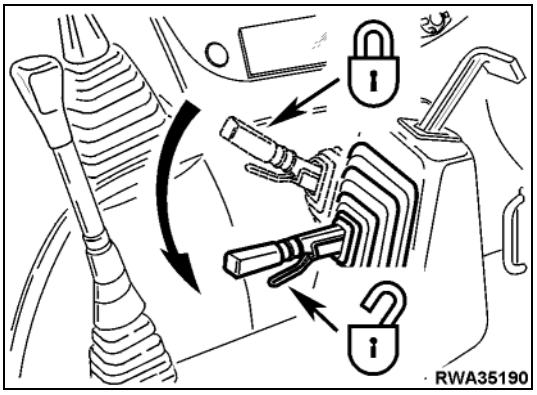


The operator must be seated with the seat belt fastened snugly around there waist. Position the seat so you are comfortable and able to see all areas around you and easy access all controls.

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 2-46. Always keep the bucket at least 50 cm (20 in) above the ground.

⚠ WARNING

Be aware of the additional height posed by the backhoe boom 1m (3 ft.) is added above the canopy that cannot be seen by the operator when the machine is in the travel posture.



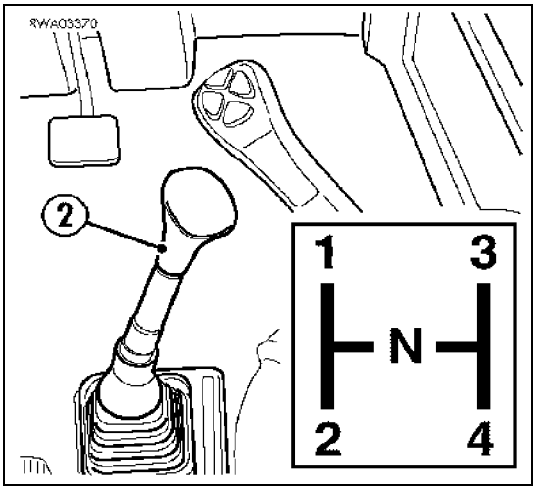
Be sure both brake pedals are locked. See "BRAKE PEDALS" on page 2-19.

Be sure the engine is at an idle.

Once you are sure all personnel are clear of your travel path, place your foot on the brake pedals and release the parking brake.

⚠ WARNING

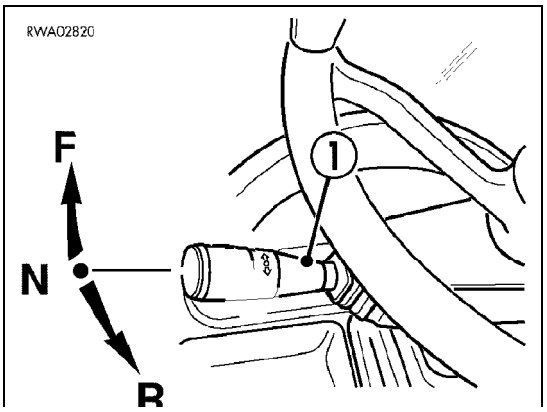
Never drive up to someone standing in front of your machines path of travel. Be sure they are standing to the side and are aware of your approach when approaching them. If the brakes should fail the possibility of running someone over becomes greater when you are traveling and they are standing in front of your machines travel path.



Select the desired speed range suitable for travel. If you will be traveling in a higher speed range, always start out at a lower speed range and shift up to the higher ranges.

See "GEAR SHIFT LEVER CONTROLS" on page 2-18.

Once you are ready to move, place the directional control lever in the (F) forward or (R) position.



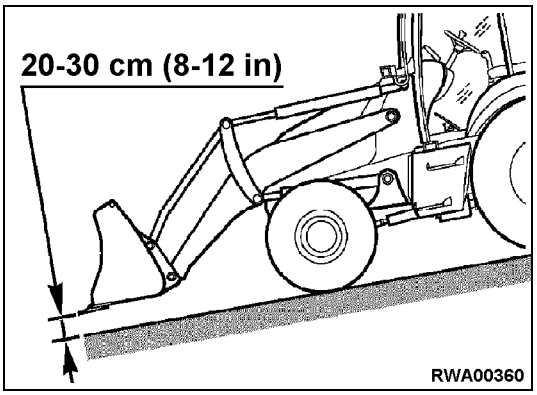
Sound your horn and proceed in the desired travel direction.

⚠ WARNING

If you are traveling in the higher speed ranges and the machine starts to rock forward and backward, slow the machine down to reduce or stop this action. Failure to do so may result in loss of control when traveling.

TRAVELING ON SLOPES

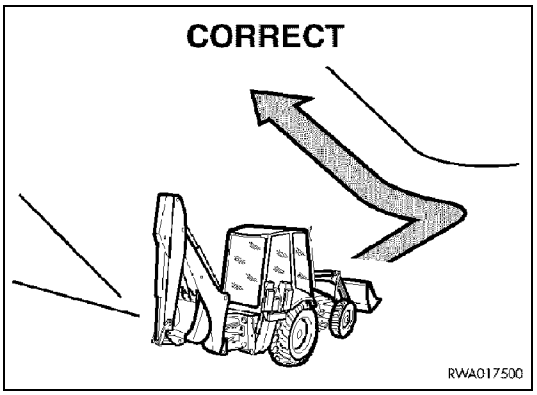
Operating on damp ground, slopes or on river banks could cause the machine to slip or possibly rollover. Extreme caution should be observed when traveling in these conditions.



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

Avoid changing 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 incline. Loss of control may result.

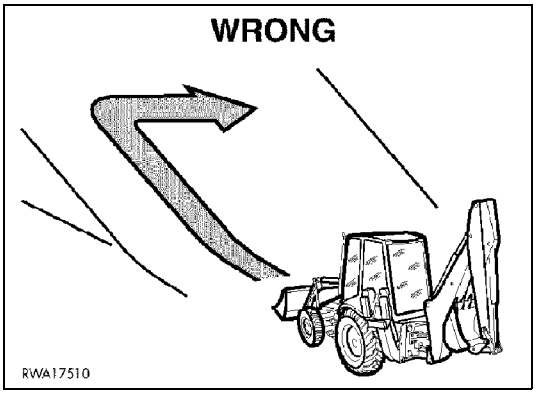
Before traveling up a slope, set the machine in a low speed range. Check your fuel supply to be sure you do not run out of fuel on the slope or incline. Check your brakes to be sure they are locked and in good working condition.



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.

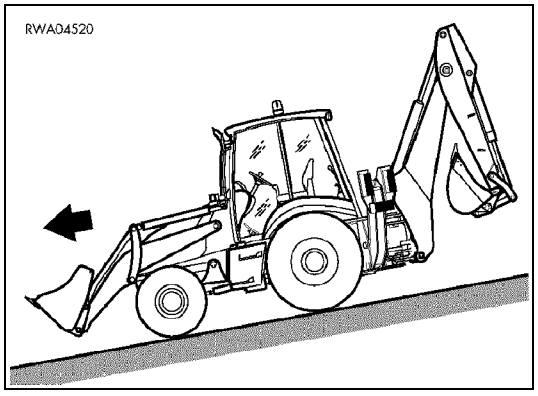
Always be aware of your travel surfaces. Wet leaves, grass or mud may hinder your control.

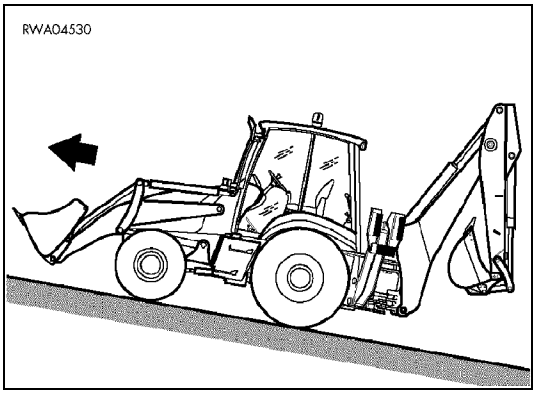
Never turn on a slope or travel across a slope.



When traveling up a hill or slope with an empty bucket, travel with the bucket directed in an upward position. When traveling down a slope or hill with an empty bucket travel with the bucket facing downward. Never shift into neutral gear 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.

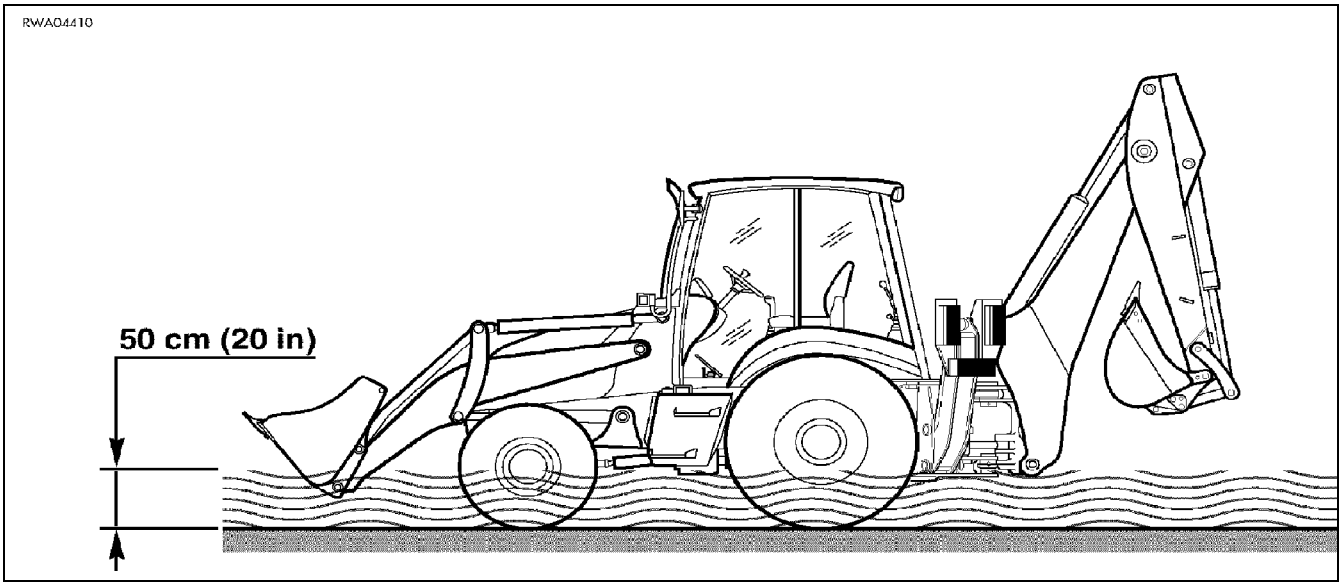




TRAVELING OR WORKING IN SWAMPY OR WET AREAS

If you will be traveling or working in areas where the machine will be immersed in water, always check the depth of the water, stability of the ground and current flow first.

It is advised to operate the machine in a water depth no deeper than 50 cm (20 in). A depth deeper than 50 cm (20 in) may damage the machine.

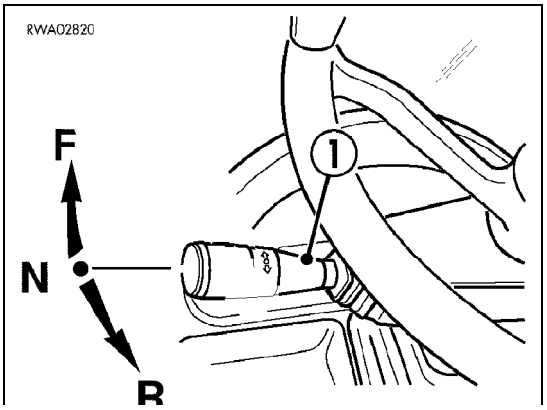


After you have completed your work or travel through water or muddy areas always clean the machine and lubricate any components that may have been immersed in the mud or water

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 it is important to use all the security features equipped with your machine.

FOR SHORT OR LONG PERIODS OF TIME



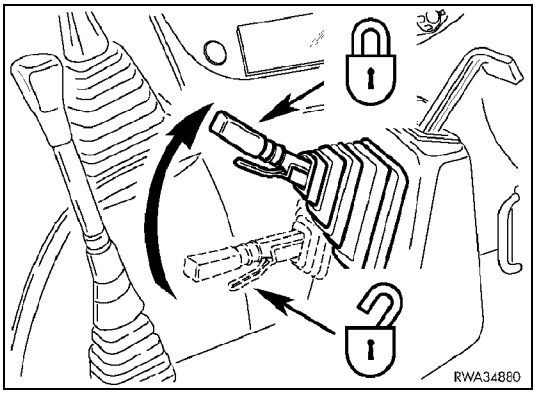
If you will be leaving the machine for a short period of time, find a flat level surface to park on.

Lower the work equipment to the ground and place the directional control in the (N) neutral position.

Turn the engine off and remove the ignition key.

Set the parking brake.

Parking For Long Periods Of Time

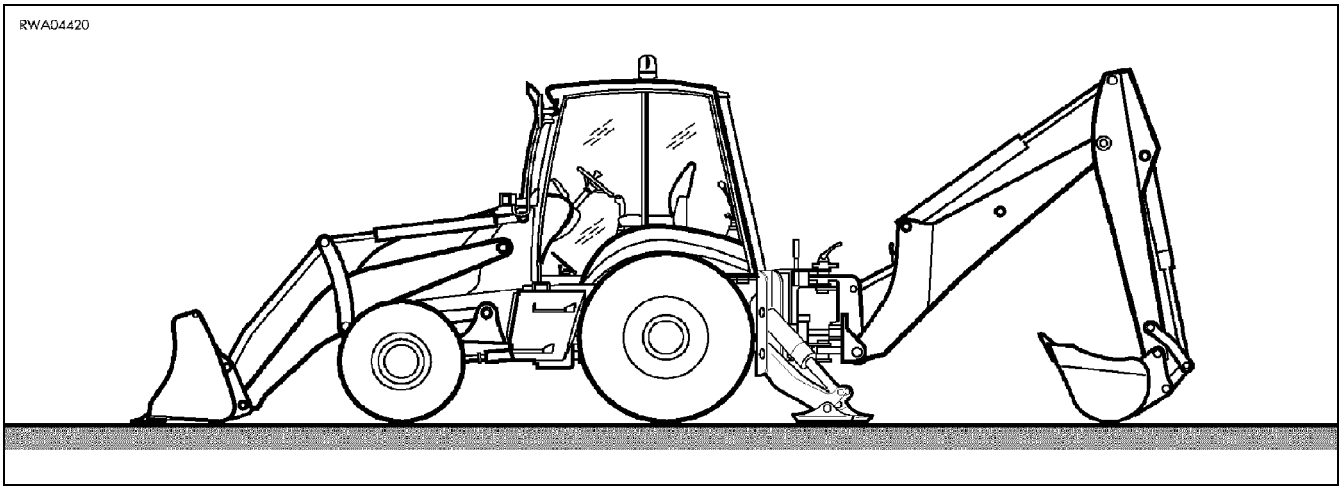


The danger of having a small child or an unauthorized person tampering with the machine when it is unattended for a long period of time is quite possible. To avoid an accident follow the same procedures as listed above.

The machine is equipped with a series of key operated locks. It is important that these locks work properly and are used when the machine is unattended for a long period of time.

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 Posture



The above illustration shows the proper parking posture. It is important to lower all work equipment and neutralize there controls. This includes front end loader, backhoe unit and outriggers.

Once the work equipment is lowered, lock the controls. See “SAFETY LOCK USAGE” on page 2-44.

PARKING ON AN INCLINE

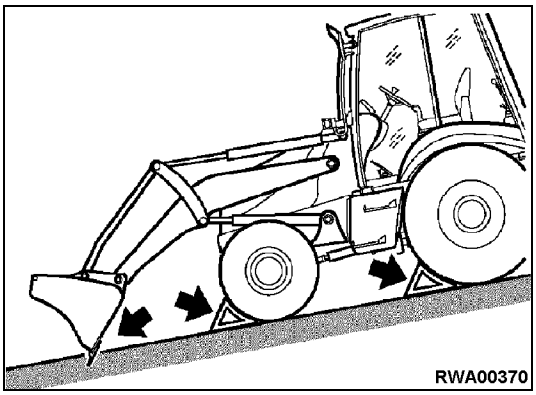
Parking on slopes, hills or any kind of an incline is not recommended. If at all possible, park the machine on a flat level surface. However, some times if this is not possible, when parking on a slope:

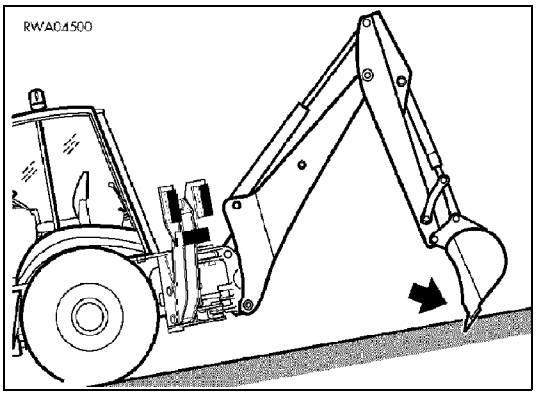
Follow all the procedures listed in parking the machine

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.





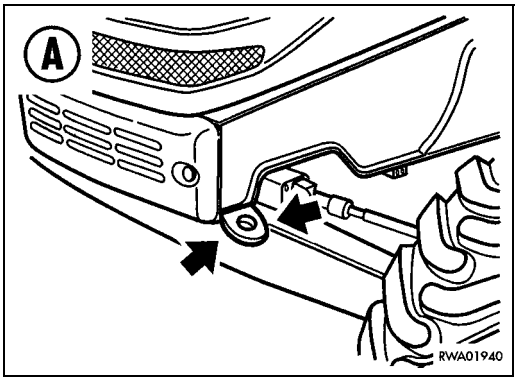
⚠ WARNING

Never park the machine with the wheels off the ground. The danger of having the machine lowered on to someone becomes possible when the machine is unattended. Always lower the work equipment and machine down to the ground fully when parking the machine.

TRANSPORTING THE MACHINE

Before transporting the machine be sure what you are using to transport the machine is capable of supporting the weight of the machine. Be sure it is wide enough and rated for the load.

LOADING AND SECURING THE MACHINE

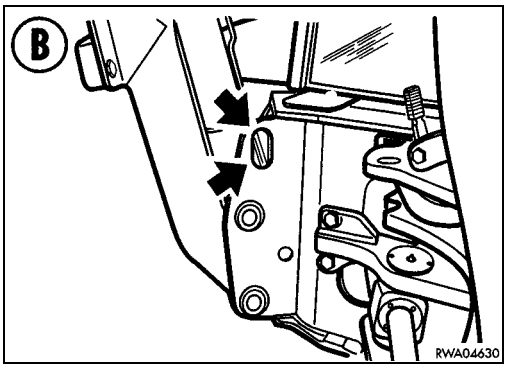


Be sure the area you will be loading the machine in is flat and dry.

Check the ramps and support surface for damage, weak spots, missing boards or excess ware. If these surfaces look unsafe, too weak or unstable do not load the machine. Be sure the loading equipment and transportation equipment are in good condition and rated for your load.

Locate the tie down and transportation brackets on the machine. Be sure they are in good condition.

When getting ready to load the machine be sure the loading ramps are no higher than 15°



Position the machine squarely with the ramps. Raise the loader bucket high enough to clear all surfaces.

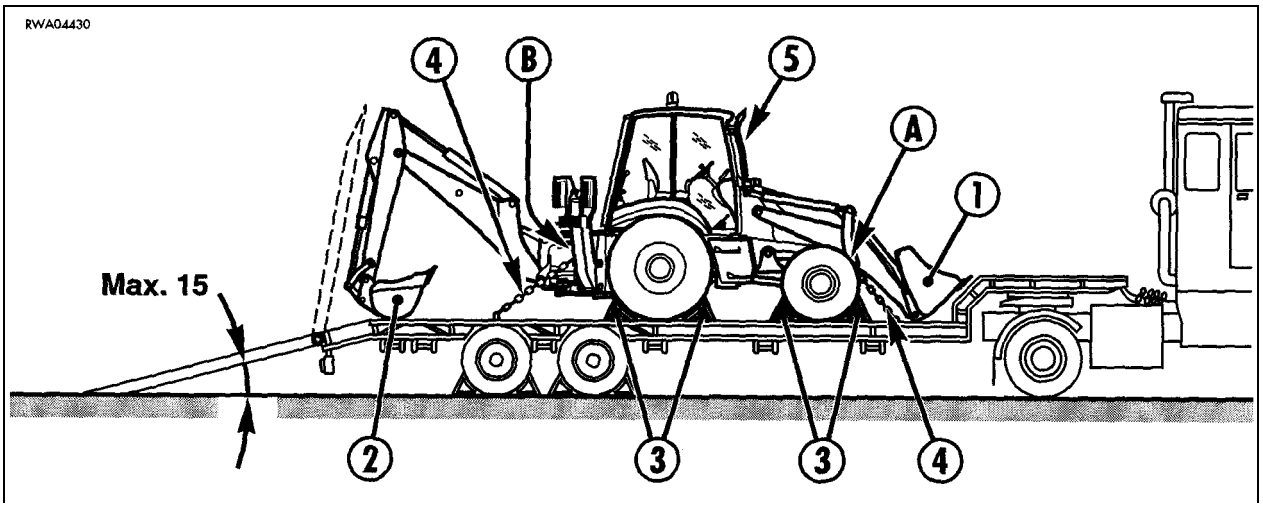
Travel up the ramp at a slow speed in low range. Position the bucket (1) facing forward and travel straight up the ramp.

Once the machine has been loaded, rest the front bucket on the floor, set the machine in neutral and set the parking brake.

Lower the backhoe (2) on to the floor and set all control locks including the backhoe lock pin. See “SAFETY LOCK USAGE” on page 2-44.

Turn the ignition key off and remove the key.

Secure the machine with tie-downs/chains (4) at the anchor points shown in illustrations (A & B).



To help keep the machine in position, place blocks (3) in front and behind the front and rear wheels for extra support.

Protect the exhaust stack (5) from moisture if needed.

EMERGENCY RECOVERY

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

HOW TO MOVE THE MACHINE

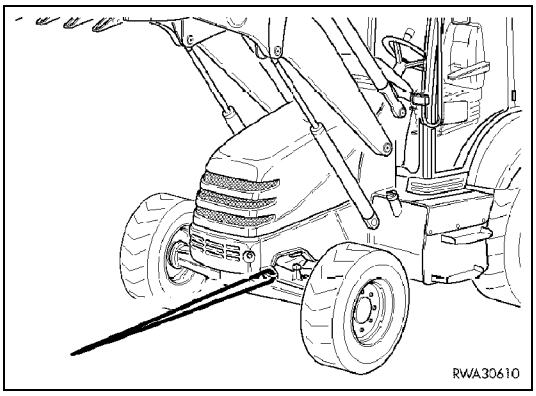
If the machine gets stuck, breaks down or runs out of fuel and cannot be removed using its only power, it is important to follow some simple procedures

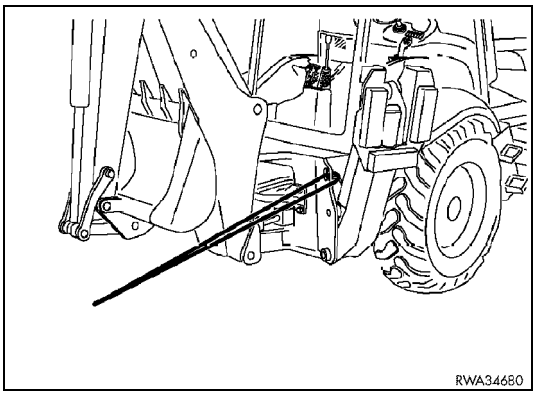
Place all the controls in neutral and disengage the four-wheel drive system before moving the machine.

Using the recovery hooks and towing cable rated at F=6200 dN (13938 lb.) tow the machine just far enough to carry our essential repairs.

Never tow the machine at an angle, always tow the machine in a straight line.

Be sure the tow cables are the same length when towing.





⚠ WARNING

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

PRECAUTIONS DURING SEASONAL CHANGES

Where temperature changes are drastic or seasonal especially in colder climates it is necessary to take some countermeasures meant to limit any damage resulting from low or extremely high temperatures.

COLD SEASONS

When the end of the work day approaches especially during extremely cold weather it is important to follow several simple steps to assure a good start-up the next work day.

- Remove any mud or water from the machine especially the undercarriage area.
- Park the machine in a protected area if possible.
- Drain any condensation from filters and water traps. See “DRAINING WATER SEPARATOR” on page 3-29.
- 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 See “WARMING THE MACHINE UP” on page 2-33.

FUEL AND LUBRICANTS

- In colder climates it is advisable to use winterized fuel DSTM D975 N 1 when ambient temperatures are below -10°C (14°F) (Do not mix gasoline with diesel fuel. This will damage the fuel system)
- Change the engine oil with a suitable viscosity oil for the climate. See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7.

COOLANT

The required standards for permanent antifreeze are SAE-J1034 and Federal Standard O-A-548D. See “CHANGING COOLANT” on page 3-53.
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 and, if the battery charge is low, the electrolyte may freeze. Keep the battery completely charged and insulated to protect it from low temperatures so that the machine can be started without problems the following day.

⚠ WARNING

To avoid explosions due to the presence of gas, 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 SEASONS

At the end of the cold season, change the lubricants and fuel back to the warm climate rated fluids. Make sure the fan belts are in good condition and the radiator fins are clean.

If you have worked in an area where road salts are used during the winter, It would be a good idea to 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 “CHANGING COOLANT” on page 3-53.
Never mix antifreezes or add additives to the cooling system.

Remark

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

BASIC TROUBLESHOOTING

Always contact your Komatsu Dealer when you have to carry out any troubleshooting procedures. If the problem or failure is not listed in the troubleshooting section, contact your Komatsu Dealer immediately and have them check the problem.

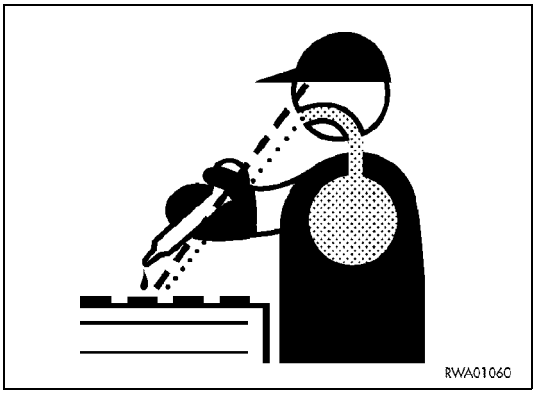
THE BATTERY

⚠ 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. The battery generates hydrogen gas, there is danger of explosion. 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 it gets on your clothes or on your skin, wash it off immediately with large quantities of water. If it 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.

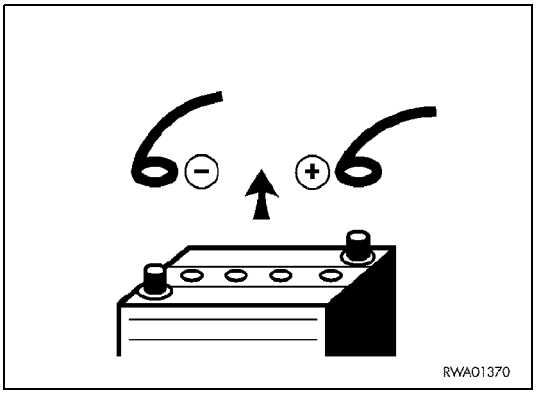
SERVICING THE BATTERY

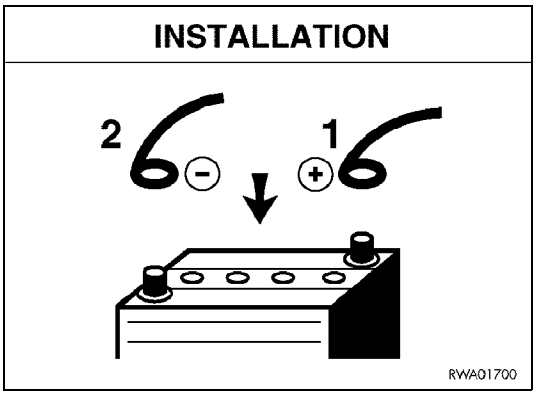
If battery tops are badly corroded, clean with diluted baking soda and warm water solution. Before charging or servicing the battery, disconnect the cable from the negative terminal of the battery. The unusually high voltage will damage the alternator. While charging the battery to avoid gas explosions, cover the battery caps with rags soaked in a baking soda solution. If electrolyte temperatures exceeds 45°C, stop charging for a while. Turn off the charger as soon as the battery is charged. Overcharging the battery may cause overheating, decreasing the quantity of electrolyte or damaging the electrode plates. When adding fluids to the battery use distilled non-mineral based water and do not over fill the battery. Always ware protective clothing when servicing the battery.



REMOVAL AND INSTALLATION

When removing the battery, first disconnect the cable from the ground, negative terminal. If a tool touches a cable connecting the positive terminal and the chassis, there is danger of sparks being emitted. 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.



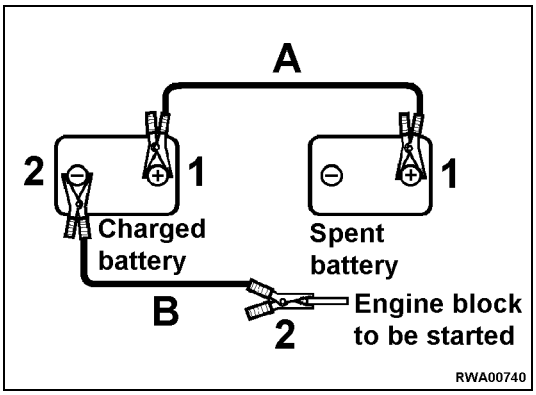


STARTING THE ENGINE WITH BOOSTER CABLE

WARNING

When connecting the cables, never cross the positive and negative terminals. Always wear safety glasses. Be careful not to let the machines touch each other, sparks from the contact could ignite the hydrogen gas. Make sure there is no mistakes in the booster cable connections,. the final connection should be at the engine block of the machine. Use care when removing the cables from the machine that has been started. Do not allow the cable ends to contact each other or the machine, to avoid hydrogen explosion.

Connecting the Booster Cables



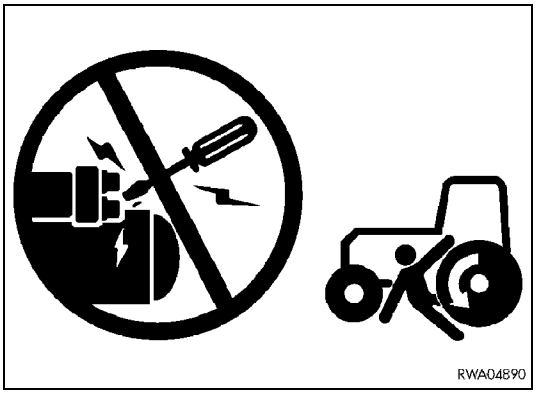
Keep the ignition switch in the OFF position. Connect the booster cable as follows, in the order of the numbers marked.

1. Make sure that the ignition switches on the operating machine and the non-operating machine are both in the OFF position.
2. Connect one clip of the booster cable (A) to the positive terminal (1) of the non-operating machine.
3. Connect the other clip of booster cable (A) to the positive terminal (2) of the operating machine.
4. Connect one clip of booster cable (B) to the negative terminal (3) of the operating machine.
5. Connect the clip of booster cable (B) to the engine block (4) of the engine to be started.

Starting the Engine

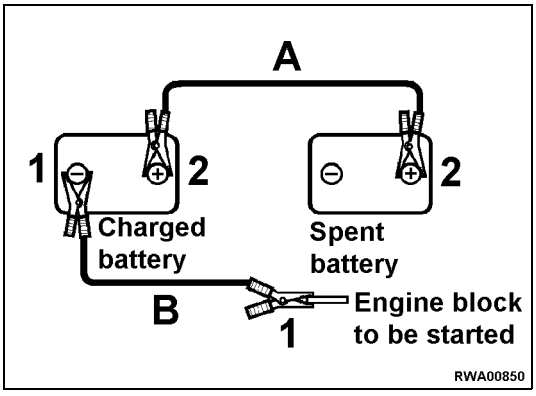
WARNING

Never jump-start the engine at the starter. Accidental movement of the machine may cause injury or even death. Always start the engine with the ignition switch in the cab.



- Make sure the clips are firmly connected to the battery terminals.
- Turn the ignition switch on the non-operating machine to the "START" position and start the engine. If the engine does not start, wait 2 minutes before trying again.

Disconnecting the Booster Cables



After the engine has started, disconnect the booster cables in the reverse order in which they were connected.

1. Remove one clip of booster cable (B) from the engine block (4) on the non-operating machine.
2. Remove the other clip of booster cable (B) from the negative terminal (3) on the operating machine.
3. Remove one clip of booster cable (A) from the positive terminal on the operating machine (2).

4. Remove the other clip of booster cable (A) from the engine block on the problem machine (1).

ELECTRICAL CIRCUITS

Trouble	Possible Cause	Remedy
Lights do not work satisfactory even with the engine running at high RPMs:	• Faulty cables.	• Check and repair terminal connections.
Lights come on intermittently with the engine running:	• Poor fan belt tension.	• Adjust fan belt tension. (See "EVERY 250 HOURS")
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	Remedy
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 even with the engine 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

GUIDE TO MAINTENANCE

- Before opening the engine hood, engage safety locks of both the front loader and backhoe.
- If it is necessary to check the hydraulic oil level in the reservoir, arrange the machine in the transport position. See “SAFETY LOCK USAGE” on page 2-44.
- Only perform operations on firm and level ground, 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. This makes it easier to locate any part causing problems. Keep the grease fittings, the breathers and the areas near the openings for the fluid level checks clean and prevent any impurities from getting into/on them.
- Draining hot oil or coolant immediately after stopping the engine is hazardous. Wait for the engine to cool down to at least 40-50°C (104-122° F) before draining hot liquids.
- After changing the oil or the filters, check if metal particles are present. If you find large quantities of metal particles, contact your Komatsu Dealer.
- Check and change the oil in clean locations and prevent any impurities from getting into the tank/container.
- Before carrying out 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 alternator.
  4. Do not apply more than 200V continuously.
  5. Connect the ground cable within 1 mm (0.039 inch) from the point on which welding will take place.
  6. Avoid placing gaskets and bearings between the welding area and ground cable.
- Do not use flammable fluids to clean machine parts. Keep exposed flames and lit cigarettes away from these fluids.
- When o-rings and gaskets are removed, thoroughly clean sealing surfaces and replace all o-rings and gaskets with new ones. Fit the o-rings and gaskets correctly when reassembling.
- Avoid keeping loose objects or tools in your pockets: they may fall out and drop into the machine, especially when you open covers and work on the machine while bending over it.
- When washing the machine, do not direct high-pressure water jet onto the radiator and heat exchanger.
- When washing the machine, protect electric system 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 components from rust. Lubricate equipment joints more frequently than usual.
- When working at dusty work sites, proceed as follows:

1. Check the air cleaner for any clogging and clean it more frequently than usual.
2. Clean the radiator and the heat exchanger frequently, to avoid any clogging of the fins.
3. Change the diesel 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.
- Do not top off with any oil different from oil used in the machine. If necessary, drain all the oil and fill tank with new different brand 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.**
- **Combustible material of some components 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.**

MAINTENANCE NOTES

- Use only Komatsu genuine replacement parts.
- Do not mix different types of oil.
- Unless specified otherwise, oils and coolant used by Komatsu before delivery of the machine are as follows:

Item	Specifications
• Engine oil	SAE 10W-30 API classification CD
• Hydraulic system oil	SAE 10W-30 API classification CD
• Biodegradable hydraulic system oil (Only for machines in which the synthetic biodegradable oil type HEE (not of plant origin) is used).	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 MOBILE MOBILFLUID 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

- Engine oil must be selected very carefully, since it lubricates the engine, which is the machine's heart; the main maintenance operations required for engine oil are as follows:
  1. Daily, check the oil level.
  2. Check condition of the oil with periodic analysis.
  3. Periodic oil changes.

COOLANT

- Engine coolant serves to keep the engine at the correct temperature and therefore to ensure optimal operating conditions; check coolant level in the expansion tank daily and top off if necessary.
- The quantity of antifreeze to be added to the coolant depends on the minimum temperature in the place where the machine is working.

  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 which has low mineral content.
- Do not use corrosion inhibitors containing soluble oil, since they damage the rubber couplings.
- In case of doubt, contact your Komatsu Dealer.

FUEL

- Always use fuel suitable for the engine. Other fuels with different specifications 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 take care not to draw condensation from the drum bottom.
- If fuel runs out, or if the fuel filter has been replaced, it is necessary to bleed the circuit.

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. Daily check the oil level in the tank.
  2. Periodically change the oil filter.
  3. Periodically change the oil and clean the suction filter.
- 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 a cylinder or a component of the hydraulic system is removed, after reassembly bleed the system by proceeding as follows:
  1. Start the engine and let it idle.
  2. Make all the cylinders perform 4-5 movements, stopping them at approximately. 100 mm (4 in) from the end of their stroke.
  3. Slowly make all the cylinders reach the end of their stroke for 3-4 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 electric system dry.
- When working on seashores or river or lake banks, protect the jack plugs from corrosion.
- Do not connect any optional 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.

NOTES REGARDING LUBRICATION

- Lubrication makes the operations carried out with the machine and work equipment smoother, while preventing wear and the noise that may be produced if the articulations are dry.
  Lubrication is to be carried out with grease or oil.
- The maintenance operations required for the components that need lubricating are the following:
  1. Check the fluid and lubricant levels.
  2. Change oil at recommended intervals.
  3. Inject grease through the grease fittings.
- Use only the specified lubricants, according to the ambient temperature.
- Always clean the grease fittings before injecting grease and remove any excess grease after lubrication; this cleaning operation must be performed with extreme care on the revolving parts.
- Keep the lubricants at the correct levels; excessive or insufficient quantities are to be avoided.

PARTS SUBJECT TO WEAR THAT PERIODICALLY NEED CHANGING

- The parts subject to wear such as filters, bucket teeth, etc. must be replaced according to the periodic maintenance intervals prescribed or when they reach their wear limit.
- The timely change of these parts ensures economical use of the machine.
- Use only Komatsu genuine parts, which alone can guarantee excellent quality and interchangeability.

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

PROPER SELECTION ACCORDING TO THE 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) Aspirated engine	7.9 liter (2 US gal) Aspirated engine
			SAE 10W									
				SAE 20W-20								
					SAE 30							
						SAE 40						
			SAE 10W-30									
				SAE 15W-40								
Hydraulic system		**SAE 5W***									150 liter (39.6 US gal)	92 liter (24.3 US gal)
			SAE 10W									
					SAE 30							
			SAE 10W-30									
Hydraulic system with biodegrad-able oil											150 liter (39.6 US gal)	92 liter (24.3 US gal)
				See page 3-12								
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 DEXRO N II D										20 liter (5.3 US gal)	17 liter (4.5 US gal)
Brake sys-tem											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)	-

OPTION FOR VERY COLD AREAS: If the temperature exceeds 10° C (50° F), contact your Komatsu Dealer for advise on the type of oil to be used.

GREASE

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

Note 1:For axle oil, use only the recommended oil as follows.

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 multi-purpose lithium grease with 3% molybdenum disulfide (Lithio EP + MoS2).

Remark

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual. Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- When starting the engine in an atmospheric temperature of lower than 0°C (32°F), be sure to use engine oil of SAE1OW, SAE2OW-20 and SAE10W-30, even though an atmospheric temperature goes up to 10°C (18°F) more or less in the day time.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 10W-40), but be sure to add single grade oil that matches the temperature in the table.
- 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	Anti-freeze Coolant (Permanent type)
1	KOMATSU	Premium multi grade 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	Anti-freeze (pure)
7	CHEVRON	RPM Delo 400 RPM Delo 500	Supreme Automatic Transmission Fluid	Moly grease	Flurant

No.	Supplier	Engine Oil API CD, CE, or CF-4	Transmission Oil GM Dexron II C4 Allison C4	Grease LI, EP, MoS_2	Anti-freeze Coolant (Permanent type)
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	Anti-freeze 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	---
13	PENNZOIL	Supreme duty fleet SAE 14W-40	Pennzoil ATF	Multi-purpose 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	---

HOMOLOGATED (HEES) SYNTHETIC BIODEGRADABLE LUBRICANTS

Our machines can be filled with synthetic biodegradable hydraulic oil type HEES not of plant origin, therefore 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

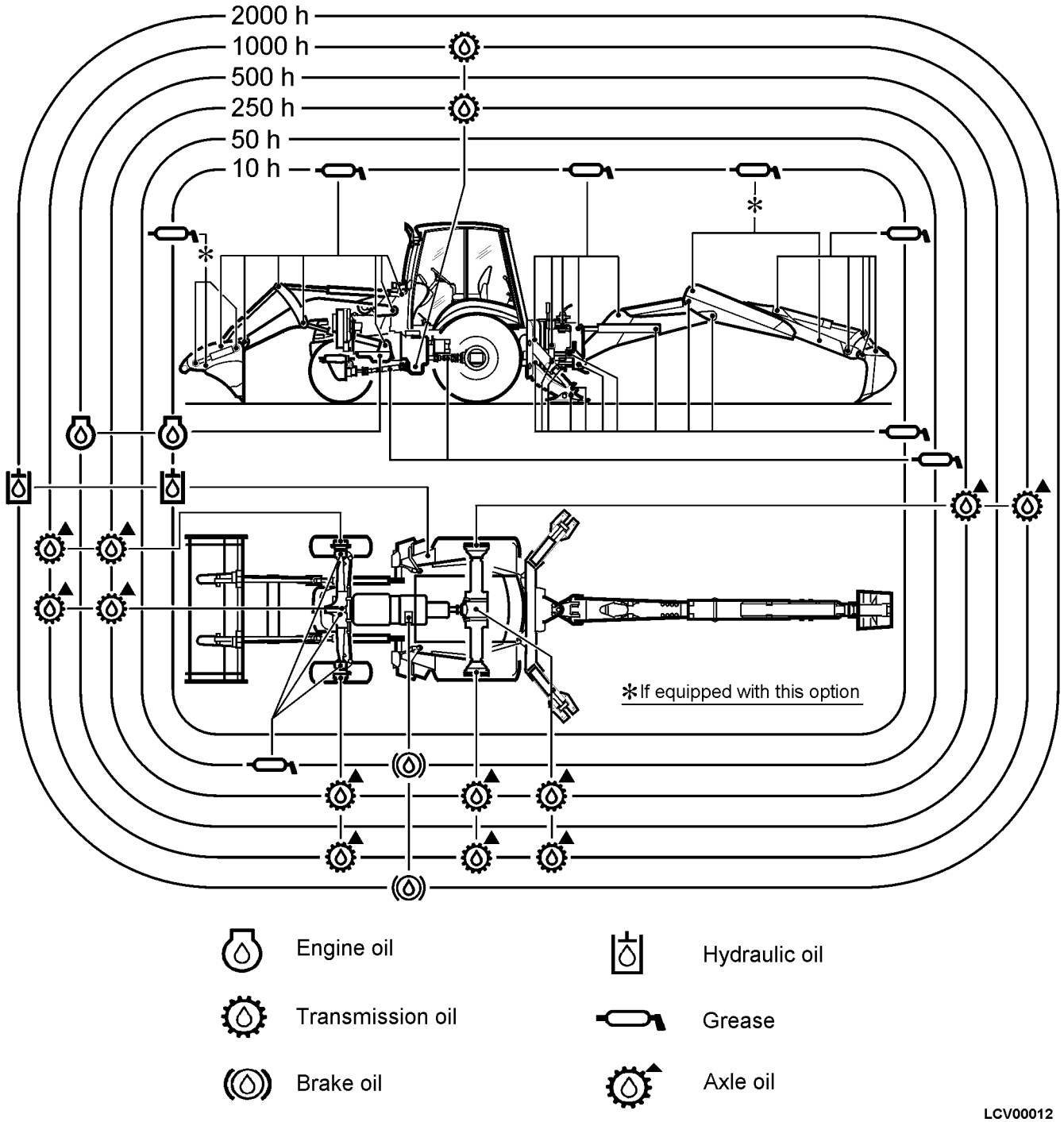
⚠ WARNING

- **It Is not possible to mix the synthetic biodegradable oil type HEES with ordinary hydraulic oils, since when the temperature increases insoluble compounds are generated, which are deposited on the filters and clog them (the maximum concentration of ordinary oil cannot exceed 1% of the total quantity of oil).**
- **The synthetic biodegradable oil can be used only in the hydraulic system; it cannot be used for the endothermic motor, the transmissions, the braking system, etc.**
- **Before introducing the synthetic biodegradable oil in the hydraulic system, empty the system completely, disconnecting the cylinders and all the parts that may contain ordinary oil, and replace the drain filter with a new one. Start the engine and let it idle without using the work equipment, wait until the oil reaches a temperature of at least 40°C (104°F), then start moving the equipment, so that all the parts of the system are filled with oil. Stop the engine and check the oil level (See "CHECKING HYDRAULIC SYSTEM OIL LEVEL" on page 3-28 ★").**

LUBRICATION DIAGRAMS

GENERAL

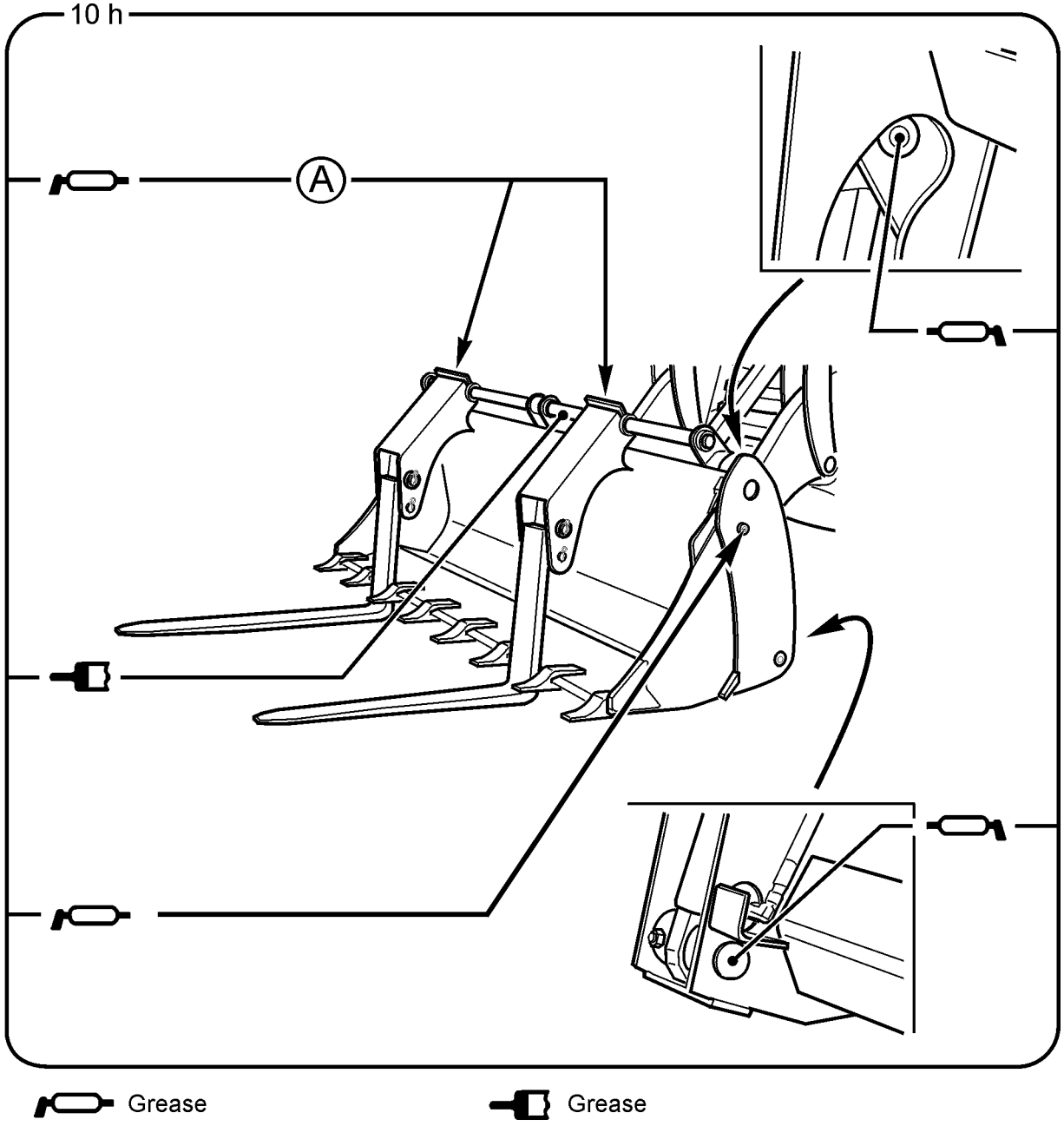
- For lubrication procedures for single points See “MAINTENANCE PLAN” on page 3-22.



Note: Use only recommended oil and grease, See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7.

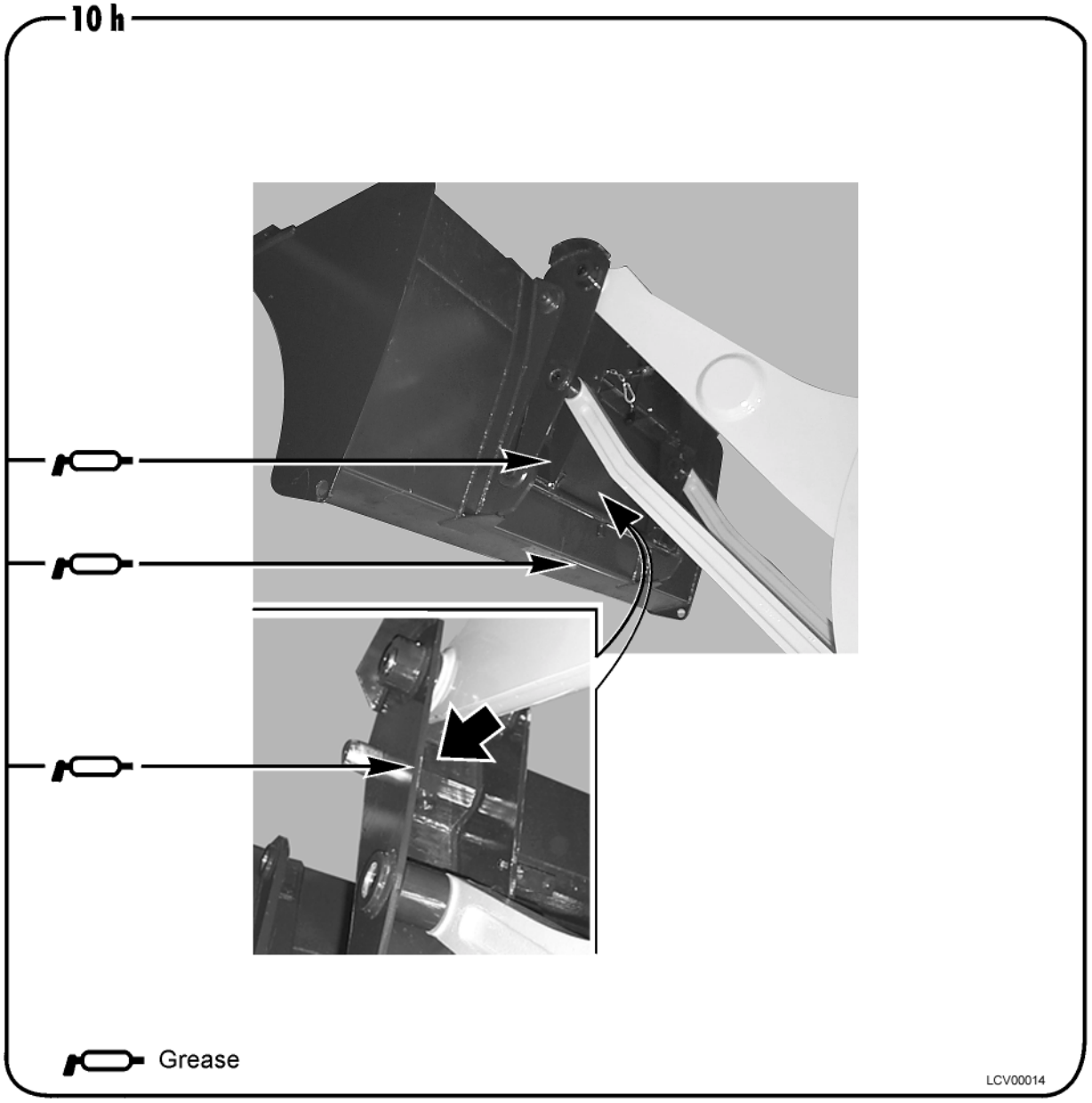
MULTIPURPOSE BUCKET AND PALLET FORKS

- 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.



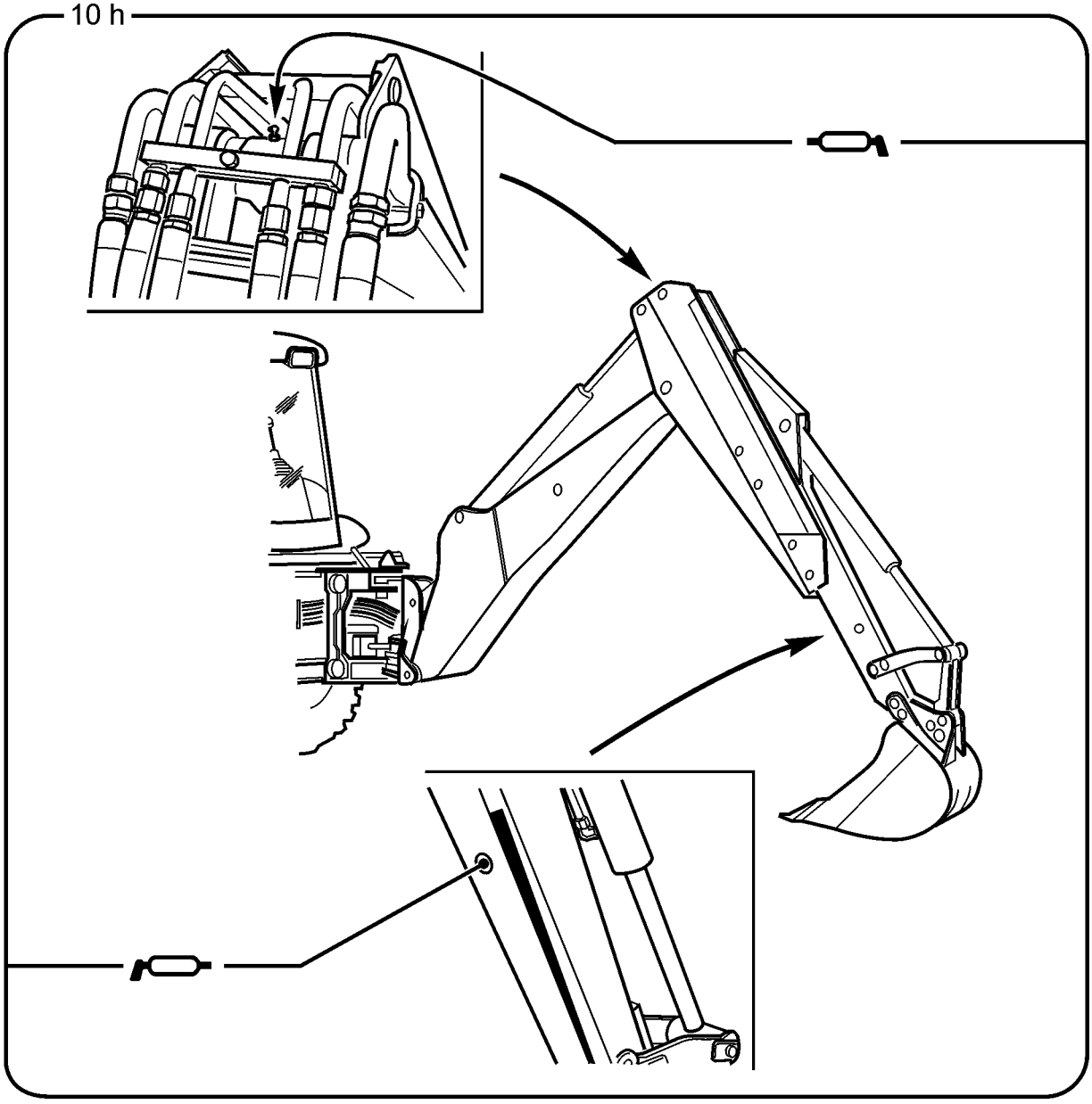
FRONT BUCKET QUICK COUPLINGS

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



TELESCOPIC ARM

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



PERIODIC REPLACEMENT OF COMPONENTS CONNECTED WITH SAFETY

To ensure safety at any moment while driving and using the machine, the operator must carry out all periodic maintenance operations prescribed. Furthermore, the operator must periodically replace the components indicated in the table on the following pages, which are especially related to safety and fire prevention rules. These components are subject to wear and since it is particularly difficult to evaluate their conditions through simple periodic maintenance, after a certain period it is advisable to change them independently of their state, in order to keep them efficient over time. Repair or 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.
In addition to periodic replacement of the components listed on the following pages, the inspections described below are to be performed on the hydraulic hoses. In case of abnormalities, perform the necessary adjustments and replacements, or institute any other required measure.

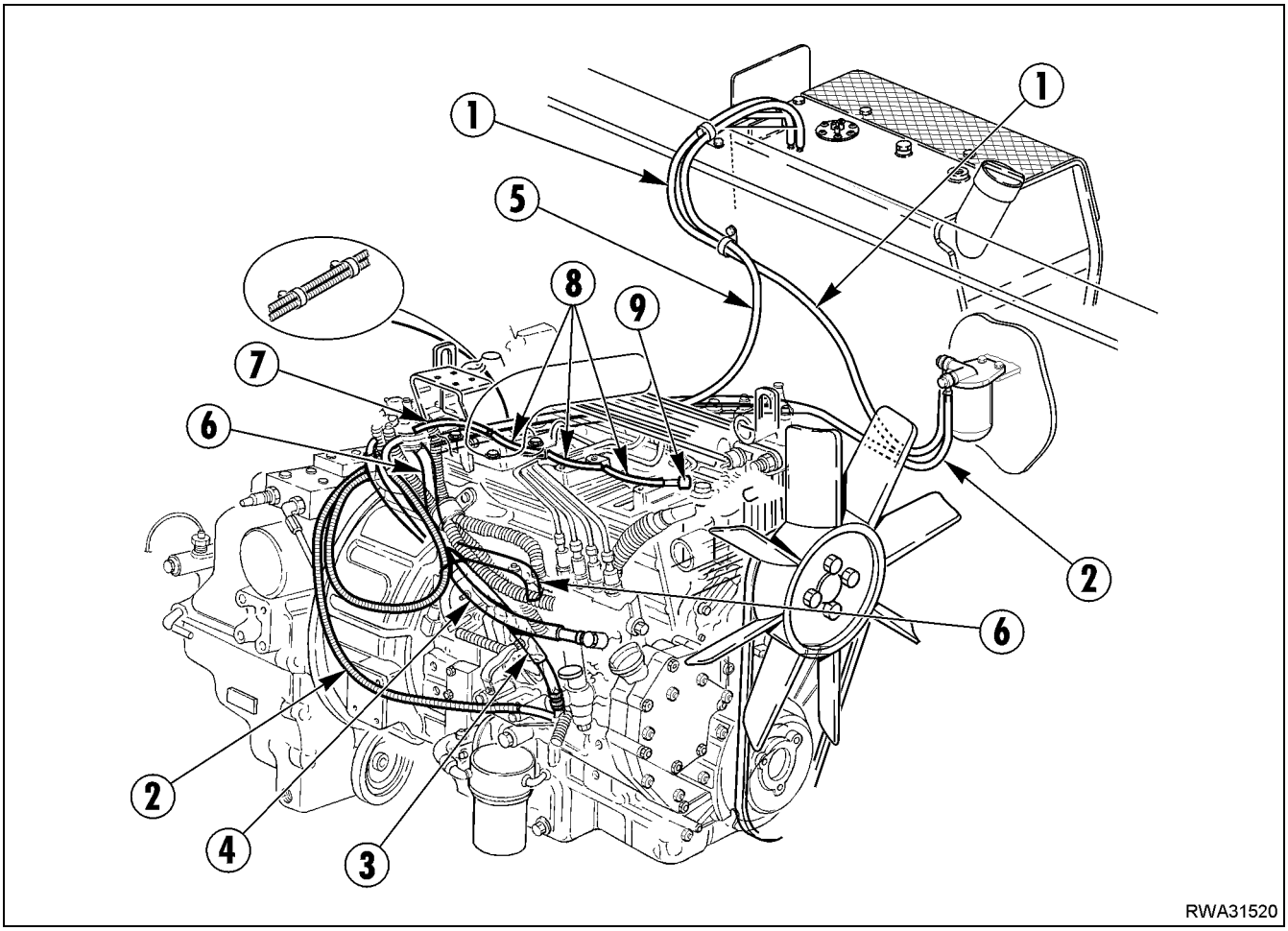
TYPE OF CHECK	CHECK ITEM
Check before starting	Leakage from joints, grease fittings, hydraulic hoses, or fuel lines.
Periodic check (monthly check)	Leakage from joints, fittings, hydraulic hoses, or fuel lines. Damaged hydraulic or fuel lines (cracks, wear and tear).
Periodic check (annual check)	Leakage 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 PARTS FOR SAFETY

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	

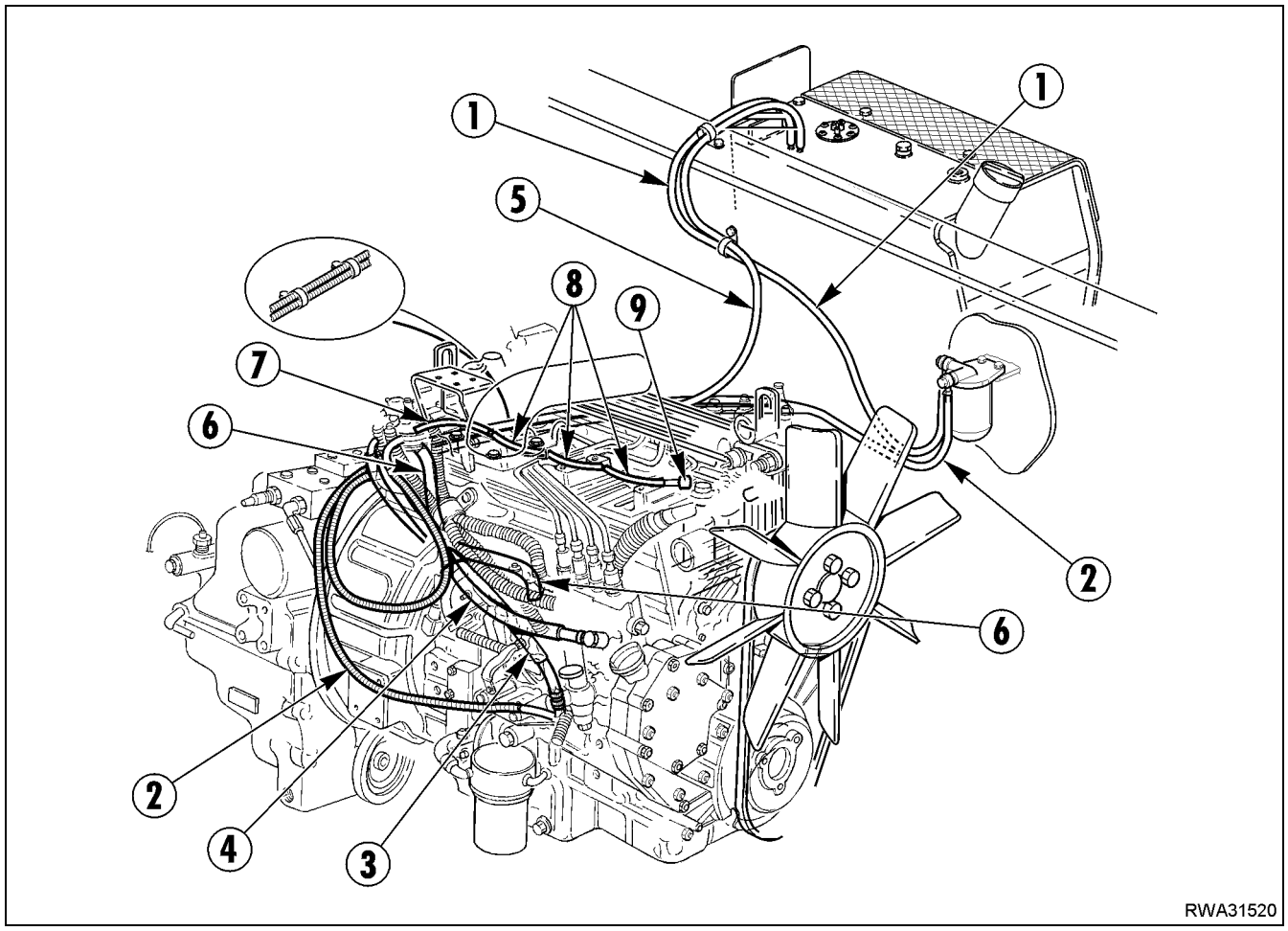
- For serial numbers and quantity of components that periodically need replacing, consult the replacement parts manual section regarding the components connected with safety and components that must be periodically replaced.
- When replacing hoses, always change o-rings, gaskets, and analogous components.



DELIVERY / RETURN HYDRAULIC SYSTEM

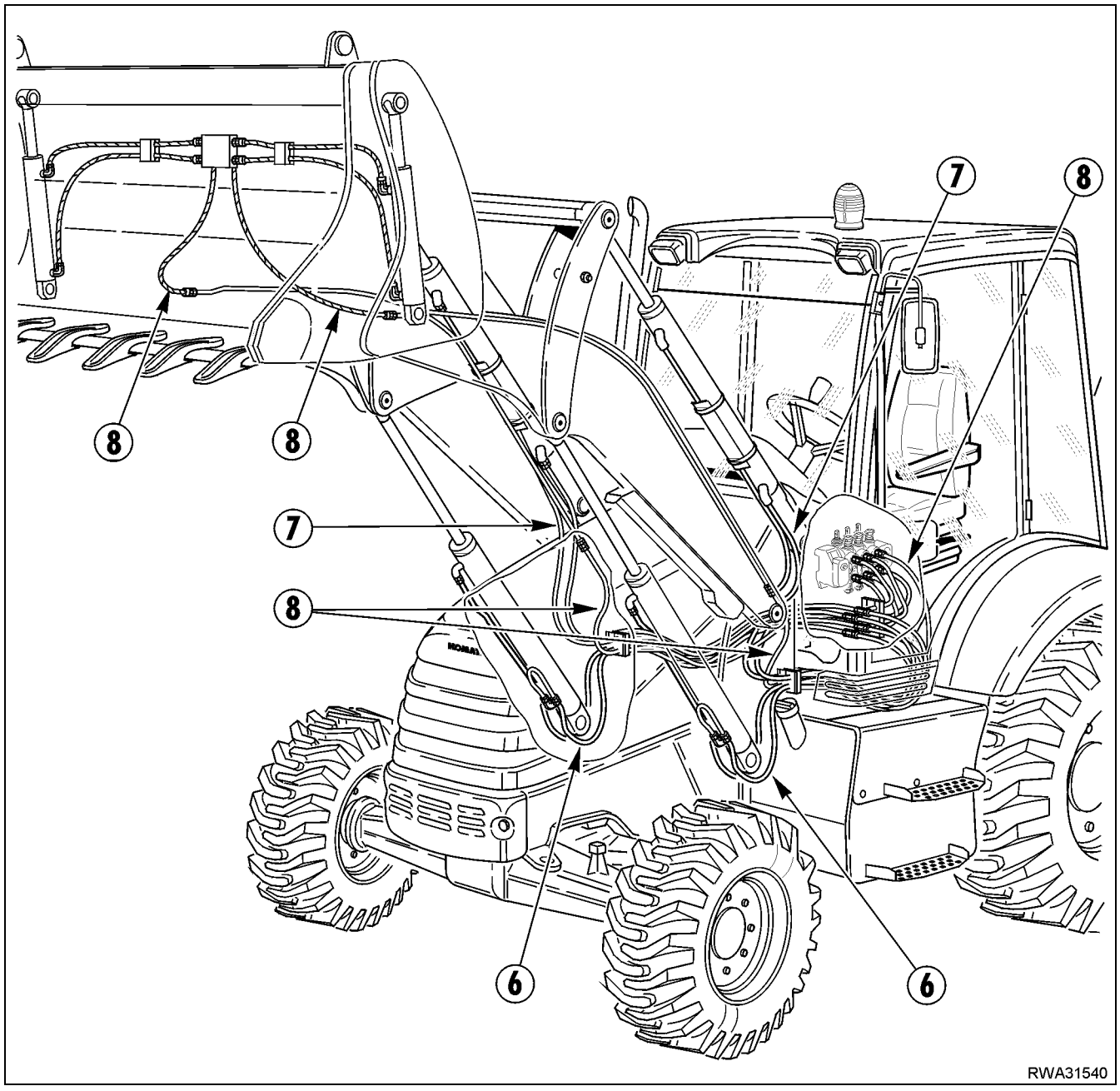
No.	Components related to safety that require periodic replacing	Qty	Replacement interval
1	Hydraulic hose (Hydraulic pump - iron tube)	1	Every 2 years or 4000 hours, whichever occurs first
2	Hydraulic hose (Iron tube - backhoe distributor)	1	
3	Hydraulic hose (Iron tube - loader distributor)	1	
4	Hydraulic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

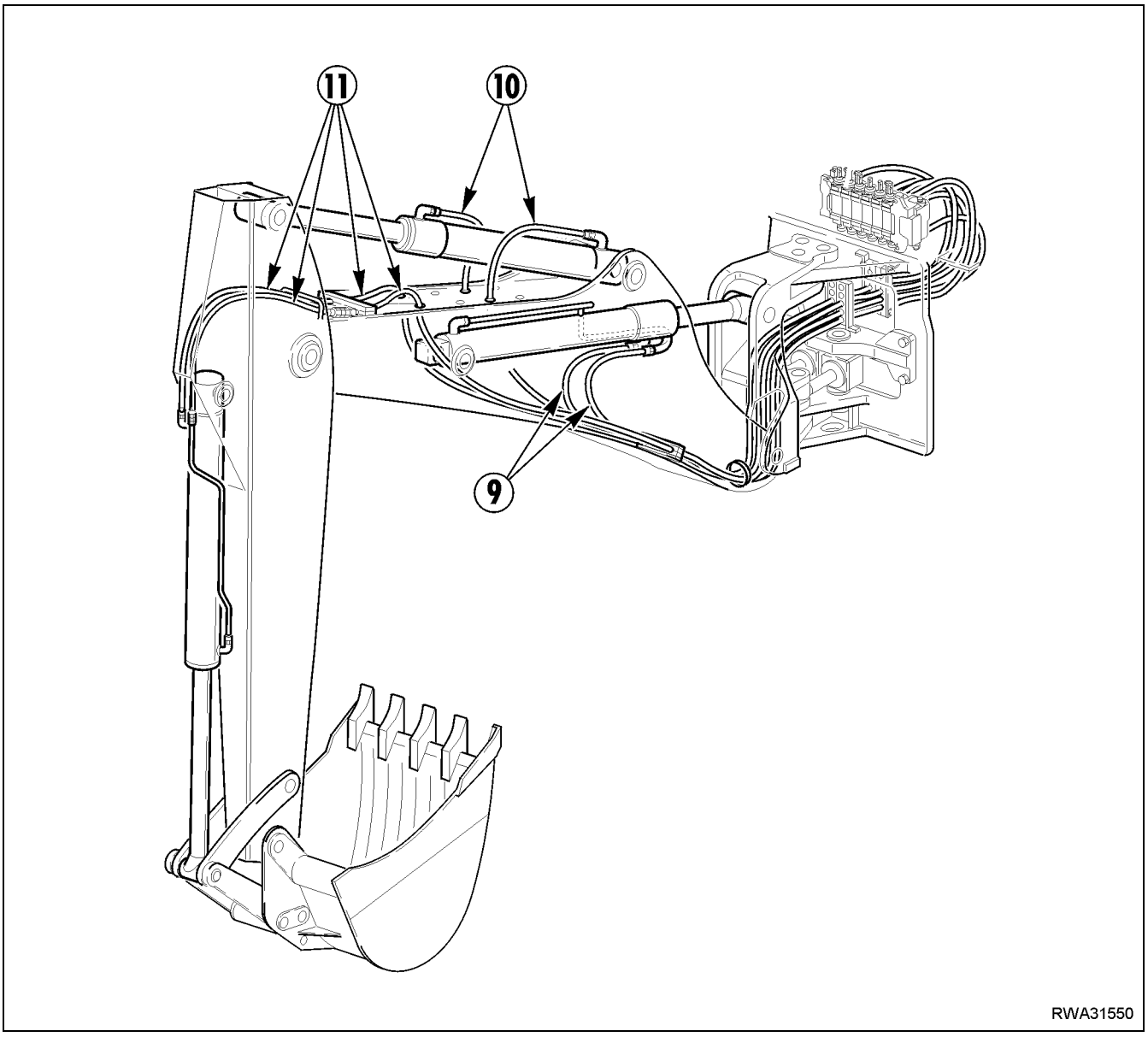
- For serial numbers and quantity of components that periodically need replacing, consult the replacement parts manual section regarding the components connected with safety and components that must be periodically replaced.
- When replacing hoses, always change o-rings, gaskets, and analogous components.



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)		

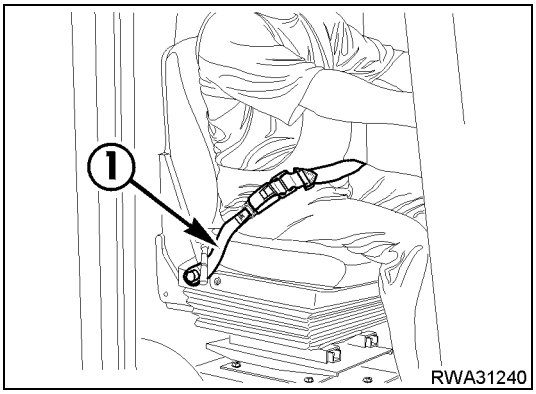




- For serial numbers and quantity of components that periodically need replacing, consult the replacement parts manual section regarding the components connected with safety and components that must be periodically replaced.
- When replacing hoses, always change o-rings, gaskets, and analogous components.

OPERATOR'S SAFETY

No.	Components related to safety that periodically need replacement	Qty	Replacement interval
1	Safety belt	1	Every 4 years



STANDARD TIGHTENING TORQUE

STANDARD TIGHTENING TORQUE FOR BOLTS AND NUTS

Thread diameter (mm)	Pitch (mm)	Wrench size (mm)	8.8			10.9		
			kgm	Nm	lb. ft.	kgm	Nm	lb. ft.
68101214	11.251. 51.752	1013171 922	0.96 ± 0.12.3 ± 0.24.6 ± 0.57.8 ± 0.812.5 ± 1	9.5 ± 123 ± 245 ± 4.977 ± 8122 ± 13	7 ± 0.7417 ± 1.532 ± 3.657 ± 5.990 ± 9.6	1.3 ± 0.153.2 ± 0.36.5 ± 0.611 ± 117.5 ±2	13.5 ± 1.532.2 ± 3.563 ± 6.5108 ± 11172 ± 18	10 ± 124 ± 2.647 ± 4.880 ± 8127 ± 13
161820222 4	22.52.5 2.53	2427303 236	19.5 ± 227 ± 338 ± 452 ± 666 ± 7	191 ± 21262 ± 28372 ± 40511 ± 57644 ± 70	141 ± 15194 ± 21275 ± 30377 ± 42475 ± 52	27 ± 337 ± 453 ± 673 ± 892 ± 10	268 ± 29366 ± 36524 ± 57719 ± 80905 ± 98	198 ± 22270 ± 26387 ± 42531 ± 59668 ± 72
2730	33.5	4146	96 ± 10131 ± 14	945 ± 1001287 ± 140	698 ± 74950 ± 103	135 ± 15184 ± 20	1329 ± 1401810 ± 190	980 ± 1031336 ± 140

SPECIFIC TIGHTENING TORQUES

⚠ WARNING

- **This torque table is not valid for screws or nuts that contain nylon parts or spring washers.**

Item	Description	kgm	Nm	lb. ft.
Cab	Front support screws Rear support screws	20 ± 120 ± 1	196 ± 9.8196 ± 9.8	145 ± 7.4145 ± 7.4
Wheels	Front Rear	35.7 ± 151 ± 1	350 ± 9.8500 ± 9.8	258 ± 7.4369 ± 7.4
Front bucket	Teeth	14.5 ± 1	143 ± 9.8	106 ± 7.4
Backhoe bucket	Central teeth Side teeth	14.5 ± 114.5 ± 1	143 ± 9.8143 ± 9.8	106 ± 7.4106 ± 7.4
Engine and transmission	Front support central screw Rear support central screw	20 ± 120 ± 1	196 ± 9.8196 ± 9.8	145 ± 7.4145 ± 7.4

MAINTENANCE PLAN

CHECKS BEFORE STARTING

Item	Description	Operation	Page
a	Various checks	Check	3-26
b	Fuel tank	Check, (add fluid)	3-26
c	Coolant	Check	3-27
d	Engine oil pan	Check	3-27
e	Hydraulic oil tank	Check	3-28
f	Water separator	Drain water	3-29

MAINTENANCE EVERY 10 HOURS OF OPERATION

Item	Description	Operation	Page
a	Joints	Lubricate	3-29

MAINTENANCE AFTER THE FIRST 50 HOURS OF OPERATION

- Only for machines in which synthetic biodegradable oil type HEES is used.
- Perform these operations together with those to be initiated every “50 HOURS”.

Item	Description	Operation	Page
a	Hydraulic oil drain filter (Only for machines with synthetic biodegradable oil)	Change	3-32

MAINTENANCE EVERY 50 HOURS OF OPERATION

Item	Description	Operation	Page
a	Radiator	Check coolant level, (add coolant)	3-32
b	Brake system	Check oil level	3-32
c	Propeller shafts	Lubricate (6 points)	3-33
d	Front axle joints and central coupling	Lubricate (5 points)	3-34
e	Front and rear wheels	Check tire pressure	3-34
f	Electrical system	Check	3-35

MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION

- Perform these operations together with those to be initiated every “250 HOURS”.

Item	Description	Operation	Page
a	Front axle	Change oil	3-47
b	Rear axle	Change oil	3-48
c	Hydraulic transmission	Change oil	3-49
d	Hydraulic transmission filter	Change	3-50
e	Engine valves	Check clearance, (adjust)	3-50
f	Hydraulic oil drain filter	Change	3-51

MAINTENANCE EVERY 250 HOURS OF OPERATION

Item	Description	Operation	Page
a	Fan belt	Check conditions and tension, (adjust)	3-36
b	Radiators	Clean outside	3-37
c	Battery	Check electrolyte level, (add fluid)	3-37
d	Front axle	Check levels, (add oil)	3-38
e	Rear axle	Check levels, (add oil)	3-38
f	Hydraulic transmission	Check level, (add oil)	3-39
g	Front and rear wheels	Check lug nut tightening	3-39

MAINTENANCE AFTER THE FIRST 500 HOURS OF OPERATION

- Only for machines in which synthetic biodegradable oil type HEES is used.
- 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 with synthetic biodegradable oil)	Change oil and clean filter	3-40

MAINTENANCE EVERY 500 HOURS OF OPERATION

Item	Description	Operation	Page
a	Engine oil	Change	3-41
b	Engine oil filter	Change	3-42
c	Hydraulic oil drain filter	Change	3-43
d	Fuel filter	Change	3-44
e	Fuel tank	Drain condensation	3-45
f	Hydraulic oil tank (Only for machines with synthetic biodegradable oil)	Drain condensation	3-46

MAINTENANCE EVERY 1000 HOURS OF OPERATION

Item	Description	Operation	Page
a	Front axle	Change oil	3-47
b	Rear axle	Change oil	3-48
c	Hydraulic transmission	Change oil	3-49
d	Hydraulic transmission filter	Change	3-50
e	Engine valves	Check clearance, (adjust)	3-50

MAINTENANCE EVERY 2000 HOURS OF OPERATION

Item	Description	Operation	Page
a	Hydraulic oil and suction filter	Change oil and clean filter	3-51
b	Coolant	Change	3-53
c	Brake system oil	Change	3-55
d	Alternator and starter	Check	3-55

WHEN REQUIRED

Item	Description	Operation	Page
a	Engine air cleaner	Check, clean or change	3-56
b	Cab air filters	Check and clean	3-57
c	Brake system	Bleed air	3-58
d	Cooling circuit	Wash	3-59
e	Water separator	Clean	3-61
f	Front wheels	Adjust toe-in	3-61
g	Parking brake	Check and adjust	3-62
h	Service brake	Check braking	3-63
j	Brake pedals	Adjust stroke	3-64
k	Return to dig	Adjust	3-64

MAINTENANCE INTERVALS WHEN DEMOLITION HAMMER IS USED

Item	Description	Operation	Page
a	Hydraulic oil drain filter	Change cartridge	3-65
b	Hydraulic oil	Change	3-65

CHECKS BEFORE STARTING

VARIOUS CHECKS

⚠ WARNING

- **Dirt, oil, and fuel spread in the engine compartment near hot areas may cause fires and damage the machine.**
- **Check to see if there are frequent leaks, and perform any necessary repairs immediately.**
- **If this 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:

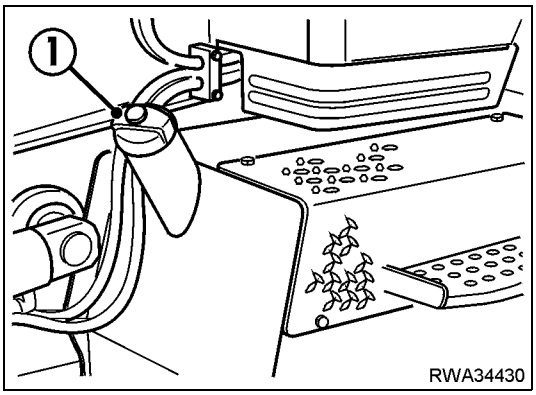
6. Soundness of safety belt.
7. Soundness and legibility of warning plates and decals.
8. Cleanliness of ladders and hand rails used to reach the driver's seat, cleanliness inside the operator's compartment.

CHECKING FUEL LEVEL

⚠ WARNING

- **When refueling, avoid spilling fuel to prevent any risk of fire. If some fuel should inadvertently be spilled, clean the dirty area immediately.**
- **Fuel is flammable; neither use exposed flames, nor smoke while refueling.**
- **Place the fuel nozzle into the filler.**

To check the fuel level, use the indicator provided on the dashboard; do not fill the tank completely. Leave space for fuel expansion.



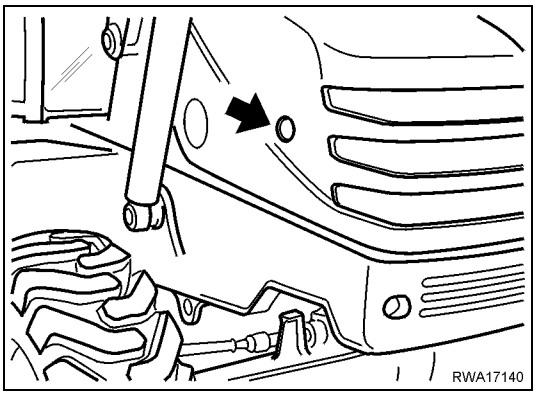
IMPORTANT

- It is advisable to refuel after work, in order to avoid the formation of condensation.
- After refueling, tighten the filler cap (1) thoroughly and lock the tank.

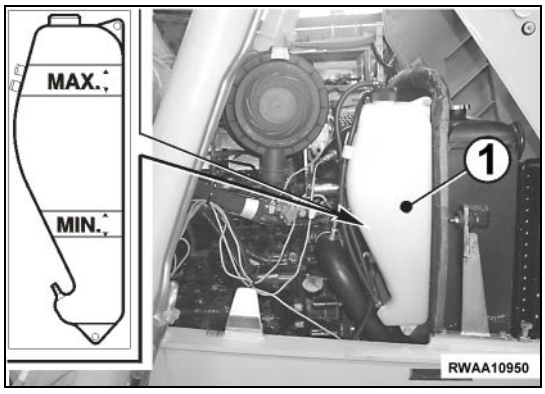
CHECKING COOLANT LEVEL

WARNING

- **Do not remove the radiator cap; the coolant must be checked with the engine cold, through the expansion tank.**



The coolant level can be checked in expansion tank (1) with the engine cold, coolant must be between the MIN. and MAX. lower marks.
The check must be performed through the hole positioned on the right side of the engine hood and the coolant level must be above the MIN. lower mark.
If the level is near the lower limit of the MIN. mark, fill the tank with coolant, and if the level decreases considerably and constantly, check the radiator, engine, and radiator body for leaks. Also check fluid level in the radiator. See "CHECKING COOLANT LEVEL" on page 3-27.
Expansion tank (1) can be reached after opening the engine hood.



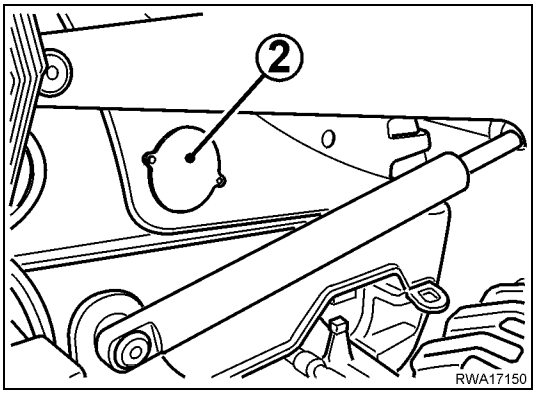
WARNING

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

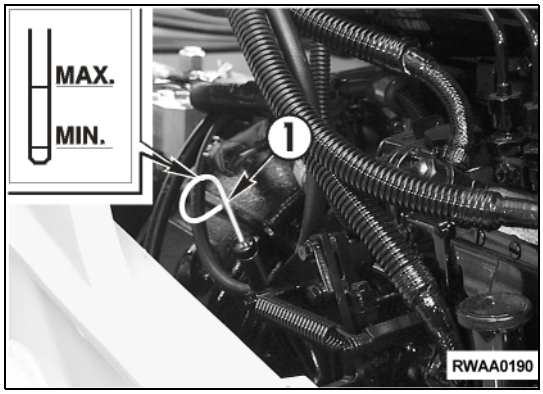
CHECKING ENGINE OIL LEVEL

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.**



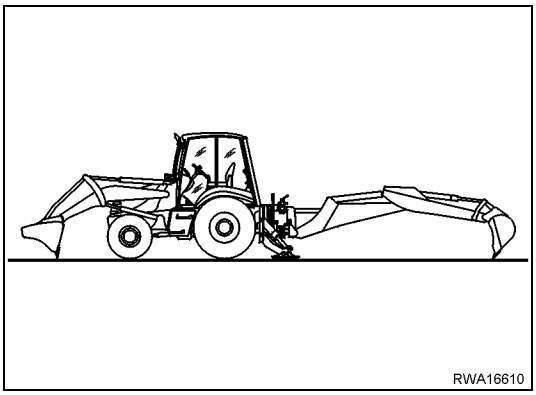
Dipstick (**1**) can be reached through opening in the right side of engine hood, which is protected by inspection cover (2).
The check must be performed with cold engine and the machine located on level ground.
Oil level can be checked on the graduated dipstick (1) and must be between MIN. and MAX. marks. If the level is near the MIN. mark, top off with oil suitable for the ambient temperature, as prescribed in the lubricant chart. See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7.



WARNING

- **If it is necessary to check the oil level during or soon after work, stop engine and wait for 15 minutes before checking.**

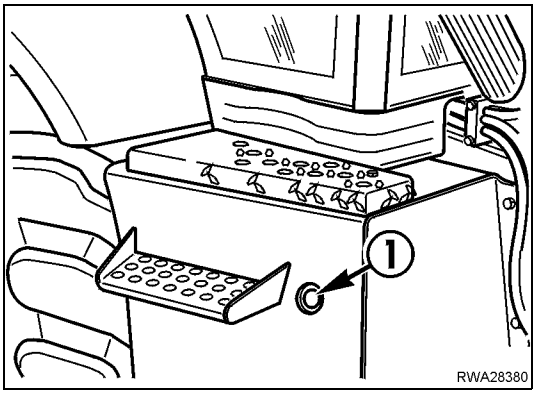
CHECKING HYDRAULIC SYSTEM OIL LEVEL



WARNING

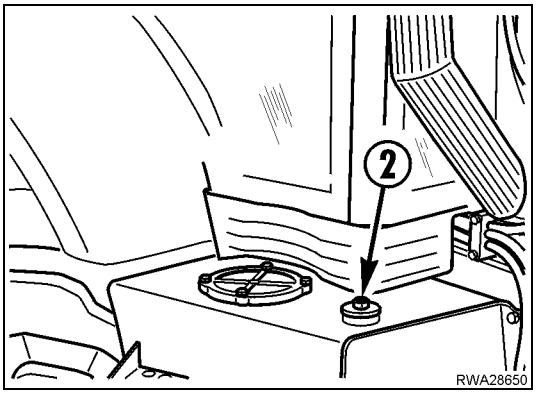
- **The oil level in the hydraulic system must be checked with cold oil and the machine positioned on level ground and in lubricating position. (See fig.).**
- **If it is necessary to top off, stop engine and then eliminate the residual pressures present in the work equipment (move the controls more than once) and in the tank by slowly loosening filling cap (2).**

The oil level must be visible through gauge (1) positioned on the tank and must be filled between MIN. and MAX. marks.
If level is near the MIN. mark, top off by adding the prescribed hydraulic oil, see "FUEL, COOLANT, AND LUBRICANTS" on page 3-7, through filler (2). Reinstall the filler cap. Use a 24 mm hexagon wrench.

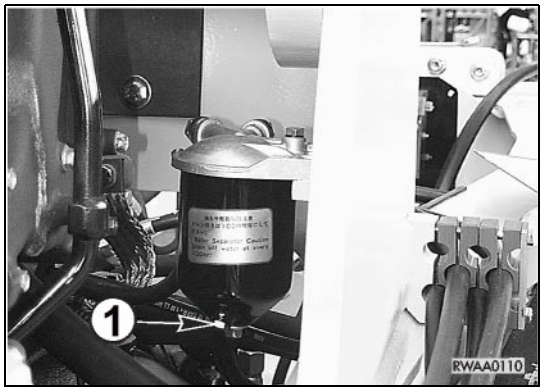


WARNING

- **When adding oil, do not exceed the MAX level. This would damage the hydraulic system and cause oil to flow out.**
- **If a constant or abnormal decrease of the oil level is observed, thoroughly check the hydraulic system, the pistons and pump for leaks.**



DRAINING WATER SEPARATOR



⚠ WARNING

- **The fuel is flammable; do not use exposed flames and do not smoke while draining the water separator.**
- **If some fuel is spilled, wipe it up immediately.**

This operation serves to drain the condensation and must be done with a full tank, in order to prevent air from entering the fuel supply system.
Condensation must be drained at the end of work, before the engine has completely cooled down, in order to prevent freezing if the temperature gets very low.
The water separator can be reached after opening the engine hood. “ENGINE HOOD” on page 2-25.
Condensation is drained by loosening plug (**1**) and waiting until only clear diesel fuel flows out. (Use a 13 mm wrench).

MAINTENANCE EVERY 10 HOURS OF OPERATION

LUBRICATING JOINTS (GREASE FITTINGS)

⚠ WARNING

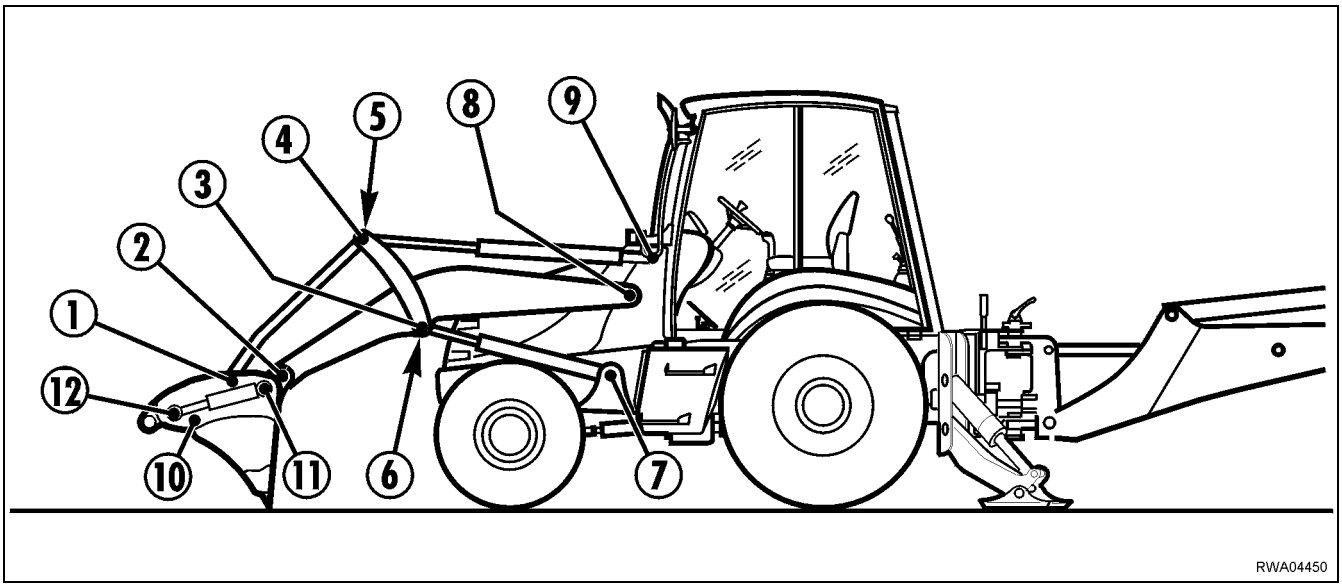
- **Clean the grease fittings before attaching the grease pump.**
- **After lubrication, remove all the contaminated grease that may have spread out of the fittings.**
- **If the machine is used in difficult conditions, perform these operations more frequently than usual.**

This maintenance operation must be done with front bucket resting on the ground, and backhoe equipment completely extended and resting on the ground, as indicated in the graphic.
Use the prescribed grease pump/grease. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7 and See “LUBRICATION DIAGRAMS” on page 3-12).

★ As a general rule, it is important to consider that each cylinder is provided with two grease fittings positioned on the couplings and that each pin serving as fulcrum point for movement is provided with at least one grease fitting.

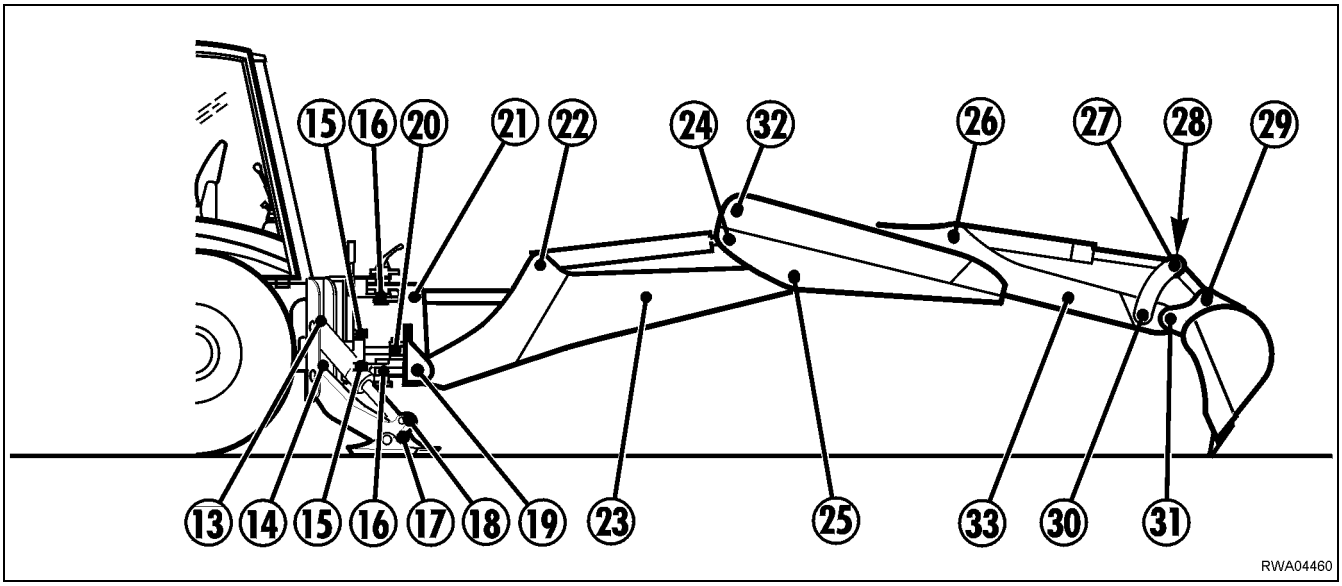
JOINT LUBRICATION POINTS

FRONT LOADER LUBRICATION LOCATIONS



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	Multi-purpose bucket fulcrum pin (option)	(2 POINTS)
11	Multi-purpose bucket cylinder base pin (option)	(2 POINTS)
12	Multi-purpose bucket cylinder head pin (option)	(2 POINTS)

BACKHOE LUBRICATION LOCATIONS



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 IN WHICH SYNTHETIC BIODEGRADABLE OIL TYPE HEES IS USED)
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 DRAIN FILTER CHANGE

For further details on the various maintenance operations, See "MAINTENANCE EVERY 500 HOURS OF OPERATION" on page 3-41.

MAINTENANCE EVERY 50 HOURS OF OPERATION

CHECKING RADIATOR FLUID LEVEL

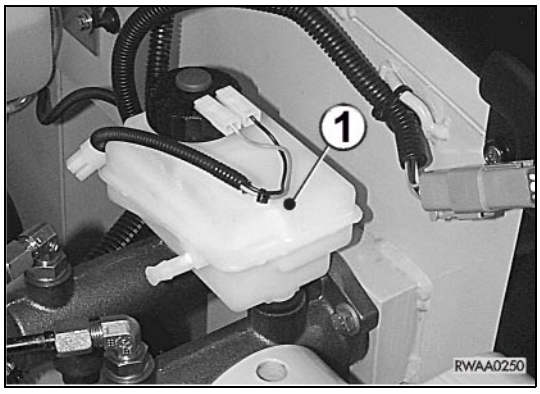
WARNING

- **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 fluid is hot, since the fluid may be sprayed out of the radiator and cause burns.**
- **Loosen the 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 level of fluid 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.

CHECKING BRAKE SYSTEM OIL LEVEL



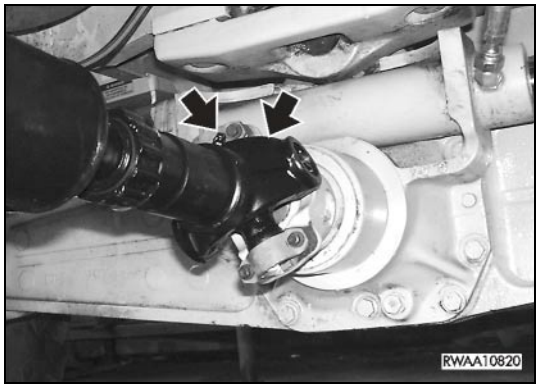
The brake reservoir (**1**) can be reached after opening the engine hood. This is a visual check and the reservoir must be topped off with the prescribed fluid until reaching the MAX. mark (See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7).

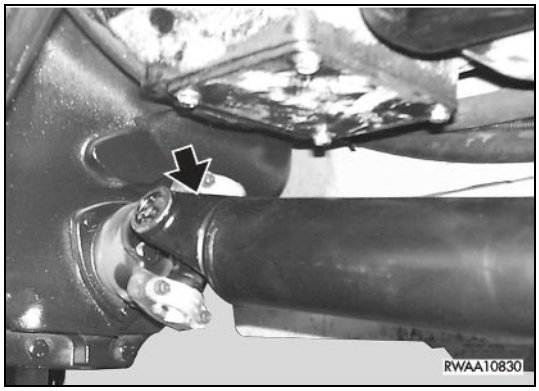
★ Use new oil only.

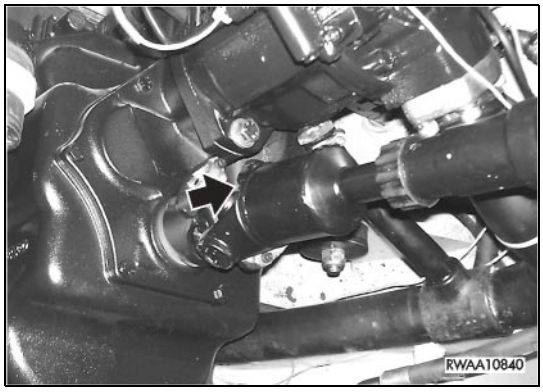
★ If constant and considerable leakages are observed, it is advisable to contact your Komatsu Dealer to have the system checked and necessary repairs made.

LUBRICATING PROPELLER SHAFTS

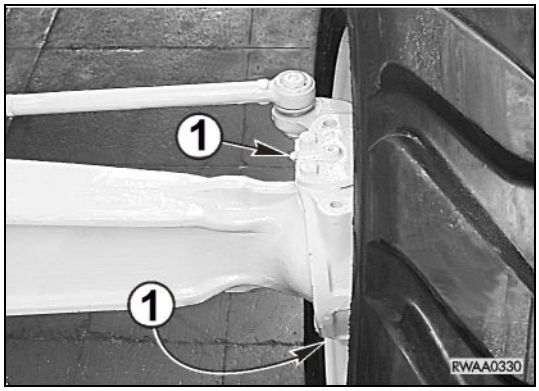
Lubrication must be done after carefully cleaning the grease fittings, by attaching the grease pump and using the prescribed grease. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).
Once lubrication has been completed, make sure that all the points have been lubricated and remove the contaminated grease that may have spread out of the joints.



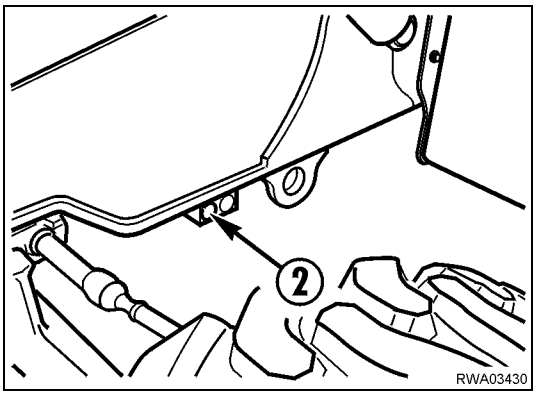




LUBRICATING FRONT AXLE JOINTS CENTRAL COUPLING



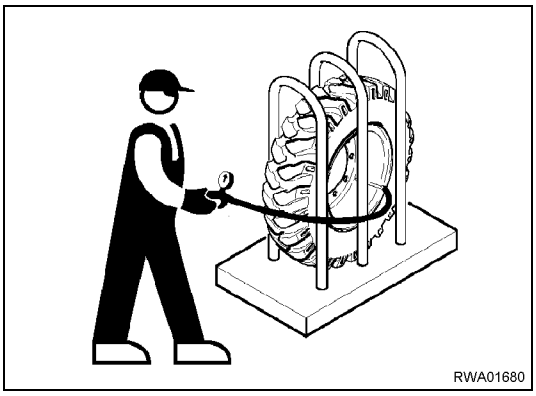
Lubrication points (1) of the wheel joints are indicated in the photo and it is important to remember that they are located in symmetrical positions, while the central joint is lubricated by means of a grease fitting (2) positioned on the frame.
Lubrication must be done after carefully cleaning the grease fittings, by attaching the grease pump and using the prescribed grease. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).
Once lubrication has been done, remove the contaminated grease that may have spread out of the joints and central coupling.



CHECKING TIRE PRESSURE

⚠ WARNING

- **Inflate the tires only after positioning them in a protection cage.**
- **To inflate the tire, stand beside the external belt.**
- **Do not exceed the pressures prescribed in the “SPECIFICATIONS section 4".**



This check is indispensable to preserve the tires, keep them efficient over time and make them last longer.
The correct pressures are indicated in the specifications section 4. (See “TIRES” on page 4-3.).
While checking the pressure, check conditions of the tread and sidewalls

CHECKING ELECTRICAL SYSTEM

⚠ WARNING

- **It the fuses are corroded, oxidized or not perfectly held in their seat, replace them only with fuses having the same capacity; 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, find the causes and repair them; always 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 DRAIN FILTER CHANGE

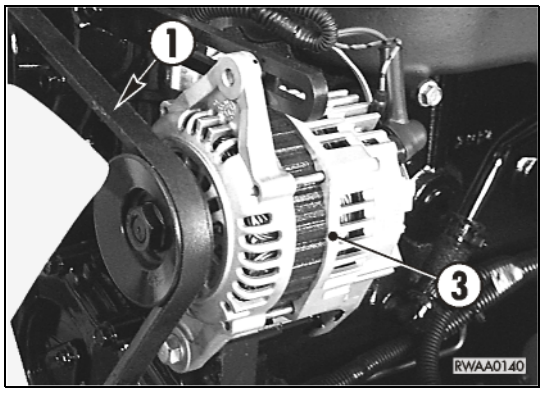
For details on the various maintenance operations,
- See "MAINTENANCE EVERY 500 HOURS OF OPERATION" on page 3-41.
- See "MAINTENANCE EVERY 1000 HOURS" on page 3-47.

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:

ADJUSTING FAN BELT TENSION

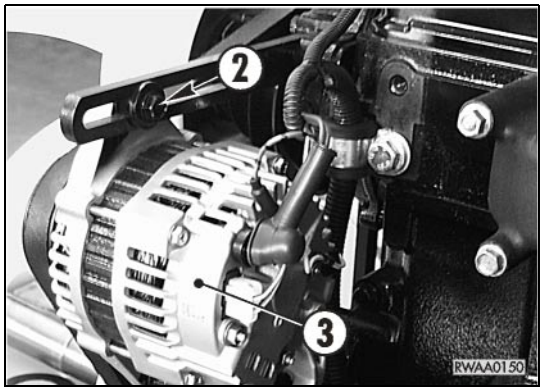


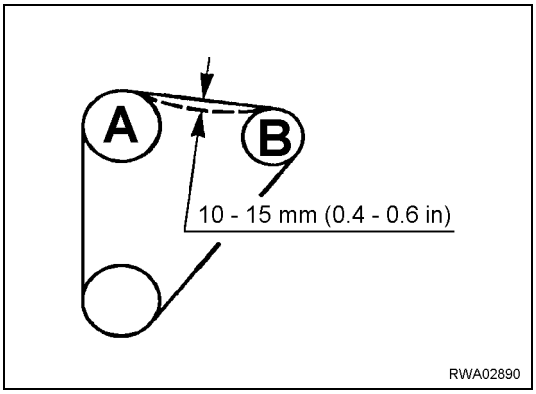
The fan belt can be reached after opening the engine hood (See “ENGINE HOOD” on page 2-25).
The test is manual: press belt (1) with a thumb on the indicated point with a force equal to approximately. 98 N (22 lb.); resulting deflection must be approximately 10 - 15 mm (0.4 - 0.6 in). If the deflection exceeds this value, loosen screw (2) that fastens alternator (3) and, with a lever inserted between the engine block and casing, make the alternator slide. Lock screw (2) and check again.

- Use a 12 mm wrench.

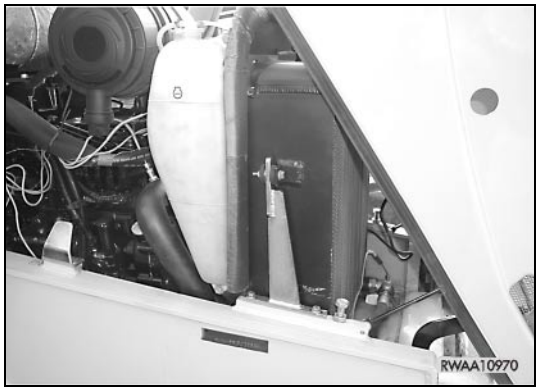
  A Fan pulley
  B Alternator pulley

★ If the belt is worn, replace it and check tension again after a few hours of operation.





CLEANING OUTSIDE OF RADIATOR



⚠ WARNING

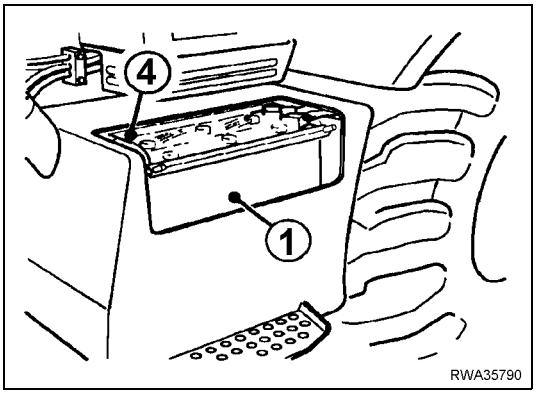
- **If compressed air, steam or water are directed against a person, they may cause injuries.**
- **Always wear safety goggles and safety shoes.**

The outside of the radiator must be cleaned with a jet of compressed air and, if necessary, with low-pressure water or steam washing. The specific products available on the market can be used, provided that the instructions given on the package are followed and that the washed parts are carefully dried at the end of the operation.

★ Do not use products containing even a small quantity of oily substances, since these facilitate the adhesion of dust, which affects the heat exchange adversely.

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

CHECKING BATTERY ELECTROLYTE LEVEL



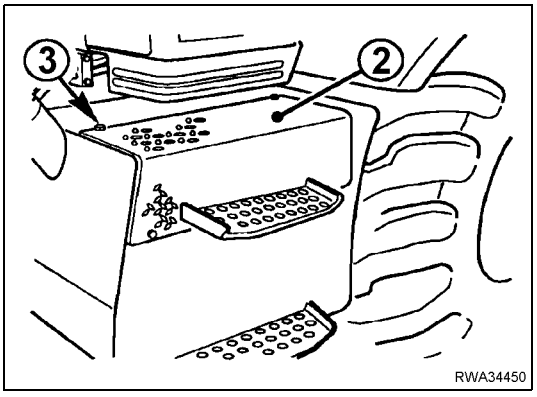
⚠ WARNING

- **Check the level with the machine parked on flat ground.**
- **Check the level only after stopping the engine and if necessary add distilled water only before starting work.**
- **Always wear safety goggles and waterproof gloves.**
- **To prevent gas explosions, do not use exposed flames. Do not smoke. Avoid producing sparks due to short circuits.**
- **The battery electrolyte is dangerous; if it comes in contact with the eyes or skin, rinse with plenty of water and consult a doctor without delay.**

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). If, on the contrary, the level is low because some fluid has been spilled, add sulfuric acid, after having diluted it until reaching the concentration suitable for the ambient temperature. (See "BATTERY"). After finishing, reinstall guard (4) and cover (2) with fastening screws (3).

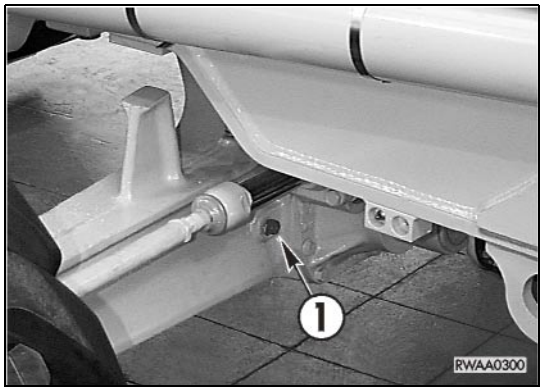


★ It is advisable to add distilled water before starting work, in order to prevent freezing.

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

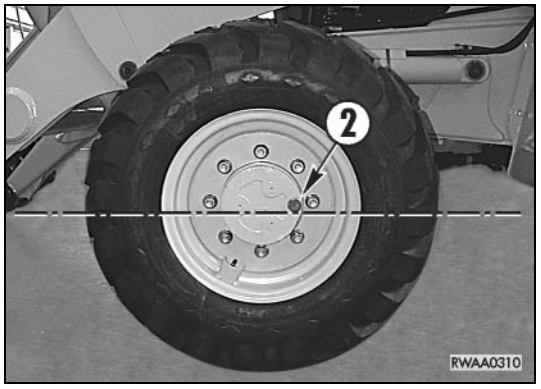
★ Make sure that the connection terminals are not oxidized; if necessary, clean them and cover them with anti-oxidation grease.

CHECKING FRONT AXLE OIL LEVELS



DIFFERENTIAL

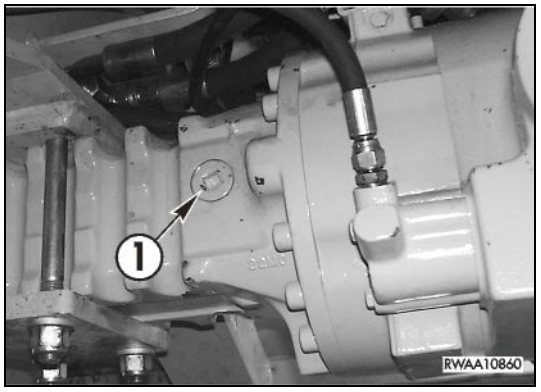
This visual check serves to verify if the lubricant reaches hole (1). If necessary, top off using the prescribed oil.
(See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).
Level hole (**1**) must also be used as the filler hole (use a 17 mm wrench).



PLANETARY

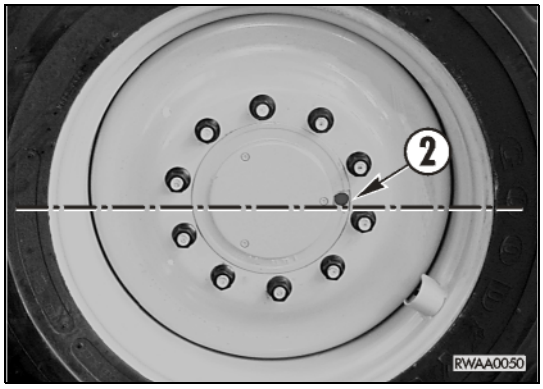
Conduct this check with each reduction gear positioned with the plug on the horizontal axis.
If necessary, move the machine slightly until the specific position for a precise check is reached.
This visual check serves to verify if the lubricant reaches hole (2). If this does not occur, add the prescribed oil. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).
(Use a 17 mm wrench).

CHECKING REAR AXLE OIL LEVELS



DIFFERENTIAL

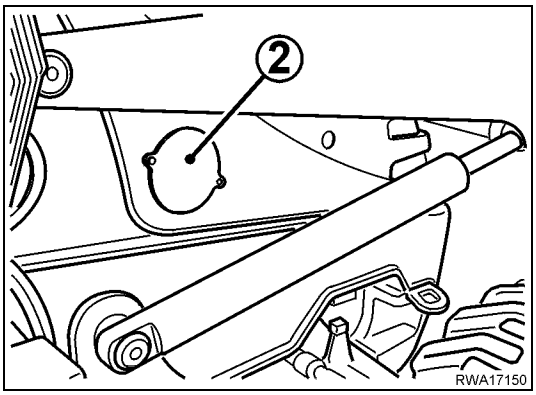
This check is visual and serves to verify if the lubricant reaches hole (1); if necessary, top off using the prescribed oil. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).
Level hole (1) must be used also as filling hole (use a 1/2” square wrench).



PLANETARY

The check must be carried out on each reduction gear positioned with plug on the horizontal axis.
If necessary, move the machine slightly until reaching the specific position that is indispensable for a precise check.
This check is visual and serves to verify that the lubricant reaches hole (2); if this does not occur, top off using the prescribed oil.
(See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).
(Use a 1/2” square wrench).

CHECKING HYDRAULIC TRANSMISSION OIL LEVEL

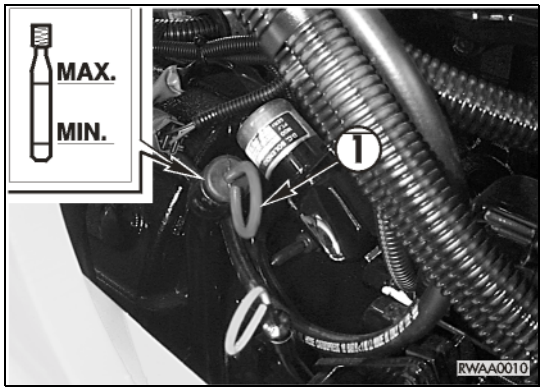


⚠ WARNING

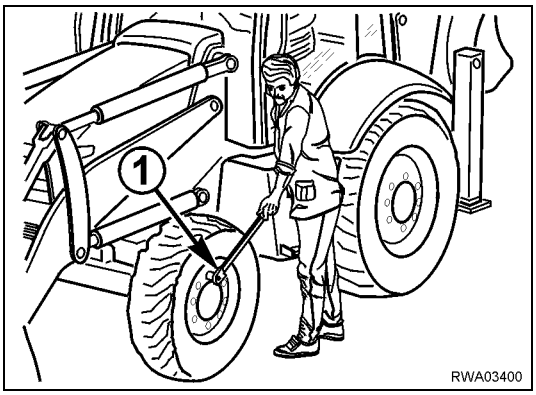
- **Level must be checked with the engine running and transmission oil at operating temperature; be very careful, in order to avoid burns.**
- **If it is necessary to add oil, stop engine before opening the engine hood. Prevent possible injury from unexpected machine movement. Never rely on directional control lever alone to keep machine from moving. It can unexpectedly roll or move under power, resulting in death or serious injury. Always engage park brake to hold the machine.**

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 at 800 - 1000 rpm and with the transmission oil at operating temperature.
The oil must always reach the maximum level mark, or be very near it.
To add oil, use the dipstick (1) filler tube and the prescribed oil. (See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7).

★ After checking the oil level, close inspection cover (2) and lock it.



CHECKING WHEEL LUG NUT TORQUE



This check is used to verify that driving torque of the wheel lug nuts on the hubs are correct.
The driving torque must be checked by means of a torque wrench (1) set according to the values indicated in paragraph See "SPECIFIC TIGHTENING TORQUES" on page 3-21.
(Use a 27 mm wrench for the front wheels).
(Use a 32 mm wrench for the rear wheels).

★ Do not Increase the specified driving torque and keep it within the prescribed ranges.

★ When the driving torque must be checked, do not lubricate the thread.

MAINTENANCE AFTER FIRST 500 HOURS OF OPERATION

★ **(Only for machines in which synthetic biodegradable oil type HEES is used)**

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

For further details on various maintenance operations, See “MAINTENANCE EVERY 2000 HOURS OF OPERATION” on page 3-51.

MAINTENANCE EVERY 500 HOURS OF OPERATION

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

CHANGING ENGINE OIL

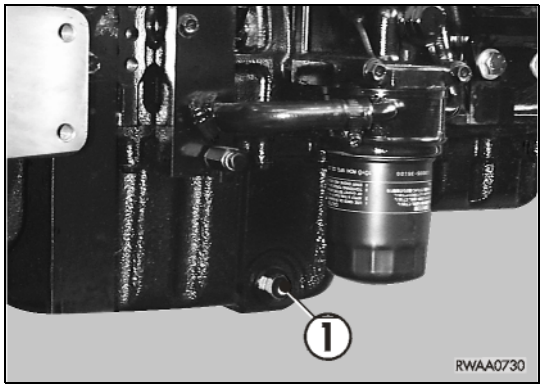
⚠ WARNING

- **Change the oil with machine parked on level ground and raised loader arm with the safety lock engaged.**
- **After machine has been operated, the engine oil is very hot and may cause burns; let the engine cool down until it reaches a temperature of 40-45°C (104-113°F) before draining the oil.**
- **Oil that may be spilled during the change makes the ground slippery, therefore, use anti-slip 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 anti-pollution regulations in force.**

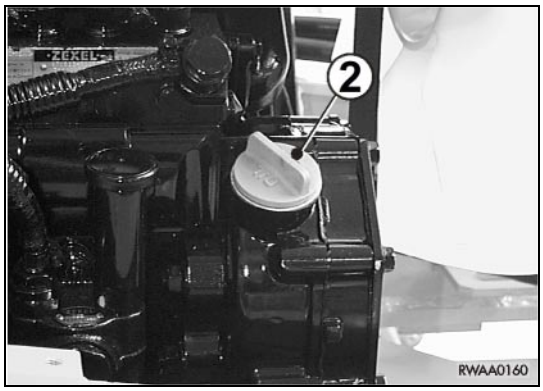
When changing engine oil, also change the filter,(See “CHANGING ENGINE OIL FILTER” on page 3-42).

Proceed as follows:

1. Open the engine hood.
2. Remove the oil pan drain plug (1). Collect used oil in a container of sufficient capacity. (Use a 19 mm wrench).

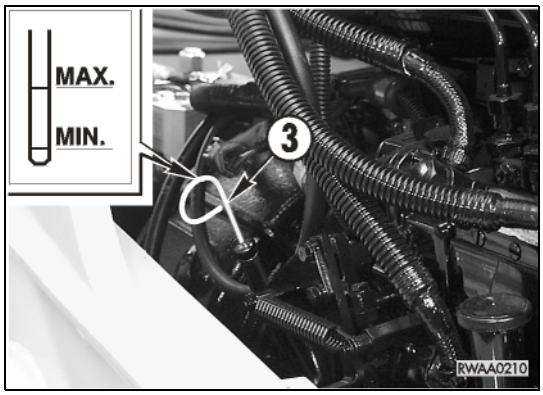


3. While the oil flows out, remove filler cap (2), so that oil can flow freely.
4. Change the engine oil filter.



5. Tighten engine oil pan drain plug (1), and add exact quantity of new oil, using dipstick (3) to make sure that oil reaches the MAX. level.
6. Reinstall filler cap (2). Start the engine, and let it run for 5 minutes and then shut it down. Check oil level again and add oil if necessary.
7. Close the engine hood.

Use oil suitable for the ambient temperature. (See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7).



CHANGING ENGINE OIL FILTER

⚠ WARNING

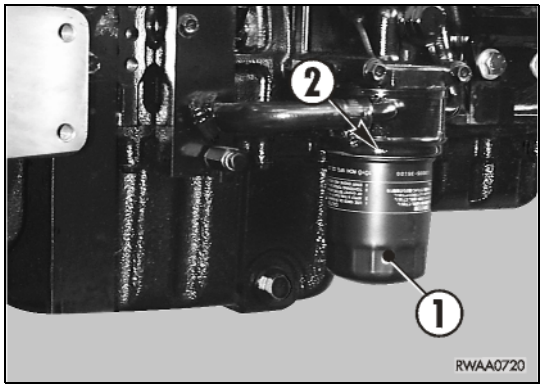
- **Immediately following machine operation, engine oil is very hot and may cause burns; let the engine cool down until it reaches a temperature of 40-45°C (104-113°F) before draining the oil.**
- **Oil that may be spilled during changes makes the ground slippery, therefore, use anti-slip shoes and immediately 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 anti-pollution regulations in force.**

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

1. Unscrew and remove old filter (1), using 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 gasket, and carefully screw it 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.

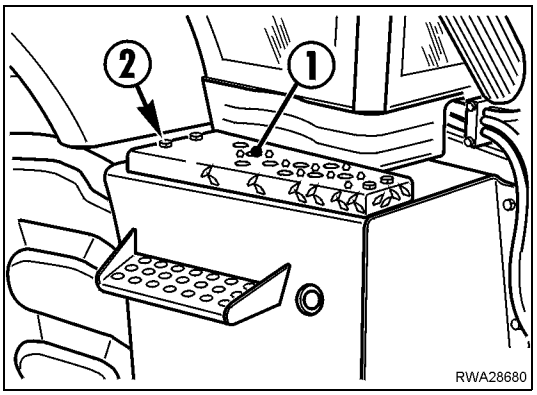
★ Do not use the wrench to further tighten the filter. The filter may get damaged and cause an oil leak.



CHANGING HYDRAULIC SYSTEM OIL FILTER

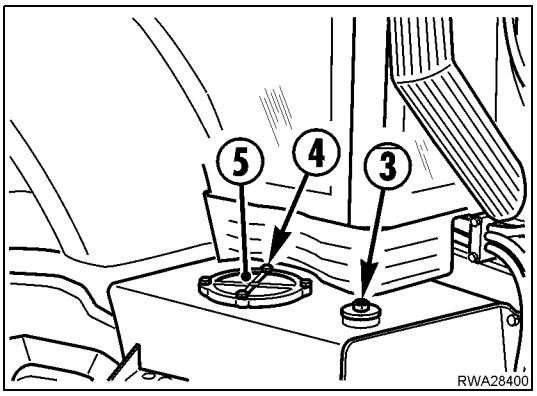
WARNING

- **Following machine operation, the hydraulic oil is very hot; let it cool down until it reaches a temperature of 40-45°C (104-113°F) before changing it.**
- **The hydraulic system is pressurized; loosen filling cap slowly 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 anti-pollution regulations in force.**

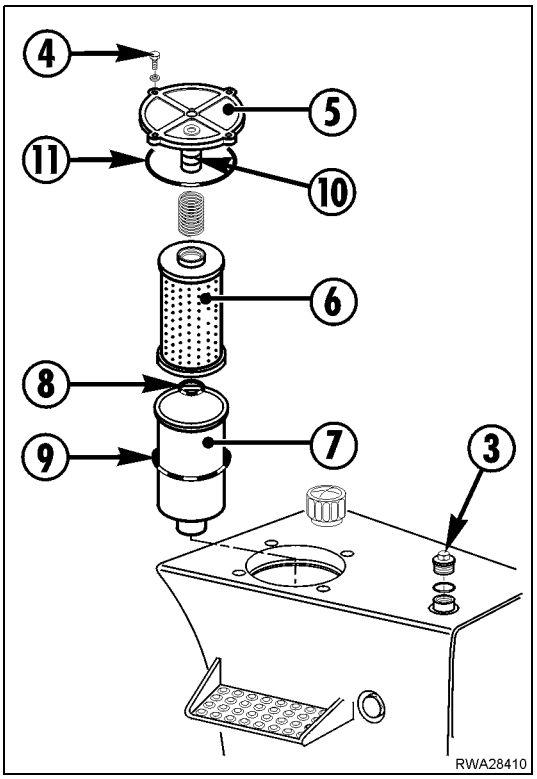


The filter is positioned on the hydraulic system drain outlet and blocks any metal particles that come off various components due to wear.
The filter can be reached after removing fastening screws (2), and upper platform (1), using a 17 mm hexagon wrench.

1. Remove filler cap (3), using a 24 mm wrench.
2. Remove screws (4) that secure filter cover (5), remove cartridge (6), and filter casing (7), using a 13 mm wrench.
3. Carefully clean filter casing (7), making sure that filter gasket (8), and casing gasket (9) are in perfect condition.
4. Clean magnetic rings (10) that are positioned on the cover to attract metal particles.

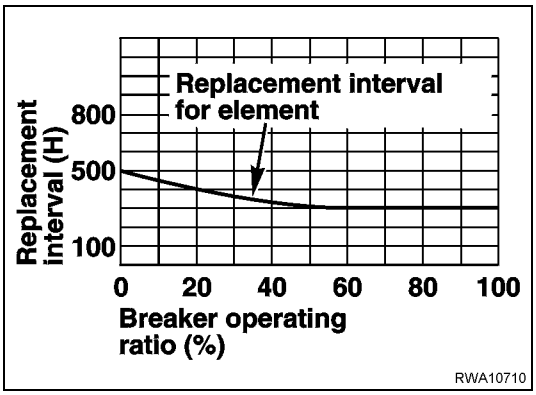


5. Change cartridge (6).
6. Reassemble unit by proceeding in the reverse order, and make sure that cover (5) and gasket (11) are in perfect condition, and is housed in the cover seat.
7. Reinstall upper platform (1) and secure it with fastening screws (2).



★ Hydraulic oil in the machines equipped with demolition hammers deteriorates more rapidly than the oil of machines used for simple digging operations. On new machines, replace filter after the first 100-150 hours of operation and for successive replacements, follow the schedule on replacement interval table.

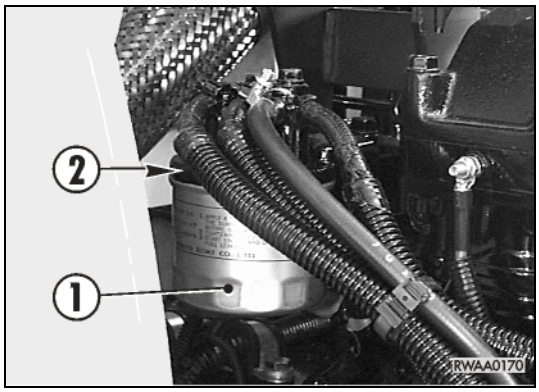
★ If the machine contains synthetic biodegradable oil type HEES, the filter must be replaced after the first 50 hours of operation.



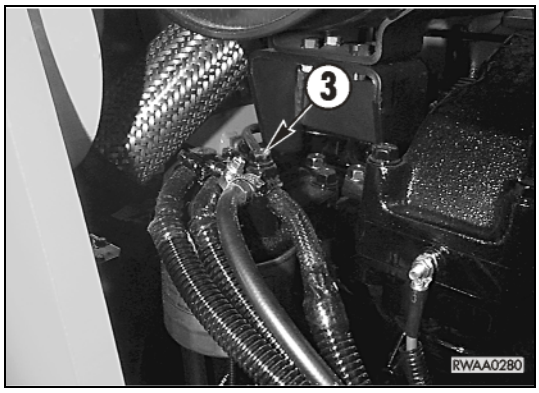
CHANGING FUEL FILTER

⚠ WARNING

- **Replace the filter element after work, when engine has cooled down to 40-45°C (104-113°F).**
- **When these operations are carried out, fuel may be spilled; clean the dirty areas immediately, in order 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 anti-pollution regulations in force.**



The fuel filter and fuel pump can be reached after opening the engine hood.



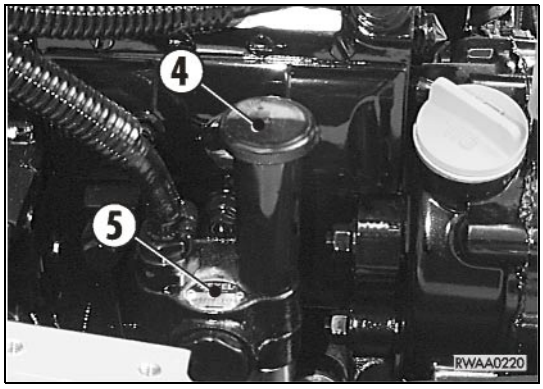
FUEL FILTER

1. Clean external surfaces of the unit and then unscrew and remove old filter (**1**) with the special wrench provided.
2. Clean inside of head (**2**).
3. Lubricate the gasket of new filter and tighten thoroughly.
4. Give it another half turn by hand.
5. Bleed the fuel supply circuit.

BLEEDING THE CIRCUIT

After filling the tank, proceed as follows:
1. Turn ignition switch to “ON” position.
2. Loosen drain screw (**3**) of filter head (**2**), using a 12 mm wrench.

3. Completely unscrew fuel pump (5) and knob (4).
4. Operate knob (4) until fuel without air bubbles flows out of the filter head. Tighten drain screw (3).
5. Press knob (4) and tighten it completely.
6. Start the engine.



★ If fuel does not flow out when the fuel pump lever is operated, rotate the driving shaft giving it 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 regularly and then stops or works irregularly, check for any air in the system. If so, check the fuel filter, water separator, and fuel pump for leaks.

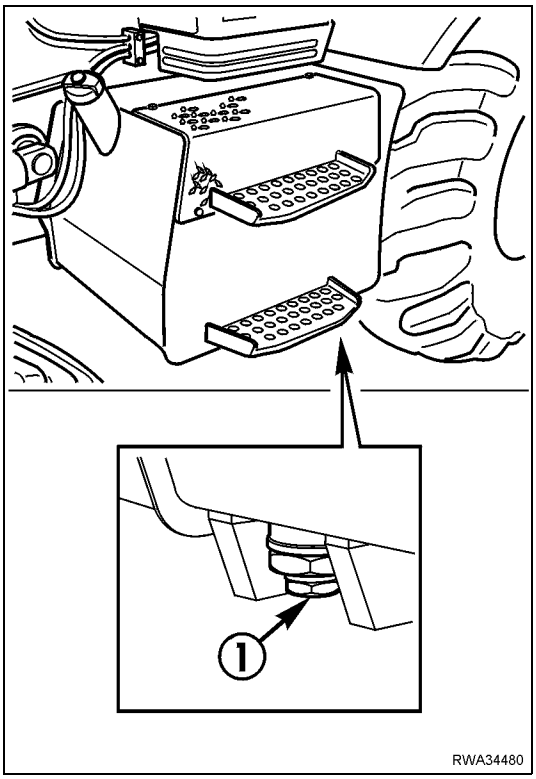
★ After all the fuel has run out, bleed the system.

DRAINING FUEL TANK

⚠ WARNING

- **When draining the fuel tank, avoid spilling fuel, since this may cause fires.**
- **If some fuel is accidentally spilled, clean the dirty area immediately, in order to prevent it from getting slippery and to avoid fires.**

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



★ The tank must be drained before starting the engine, with temperatures exceeding 0°C (32°F); when the temperature is below 0°C (32°F), the tank must be drained at the end of work or with the machine at operating temperature, to prevent condensation from freezing.

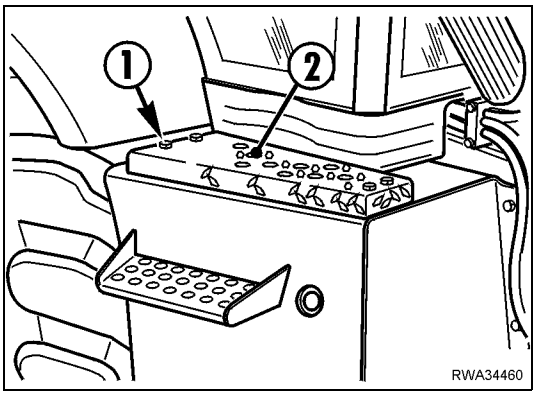
★ Any condensation and impurities that may have accumulated inside the tank must be eliminated before refueling.

DRAINING HYDRAULIC OIL TANK

(Only for machines in which the synthetic biodegradable oil type HEES is used).

⚠ WARNING

- **Stop the engine, and place machine in the correct position to perform maintenance operations. Eliminate residual pressures from the equipment (by moving the controls more than once) and from the tank (by slowly loosening the filling cap).**
- **Let the oil cool down until it reaches 40-45°C (104-113°F) before performing any maintenance.**
- **Immediately clean any area dirty with oil.**

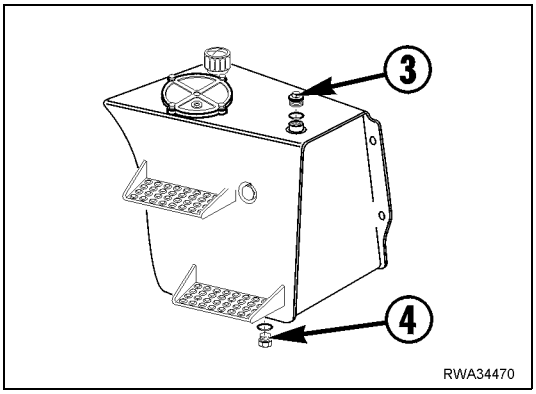


This operation serves to let condensation accumulated on the tank bottom to flow out of the tank itself.

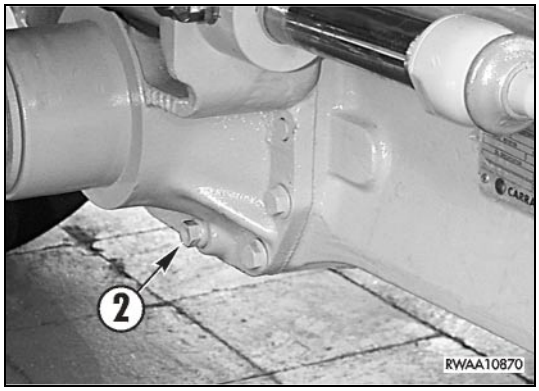
Perform the following operations in the given sequence:

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

★ Draining the tank must be done at temperatures exceeding 0°C (32°F), before starting the engine. When temperature is below 0°C (32°F), hydraulic oil tank must be drained at the end of work, or when temperature of the machine is sufficiently high, to prevent condensation from freezing and allow it to flow out of the tank.



MAINTENANCE EVERY 1000 HOURS



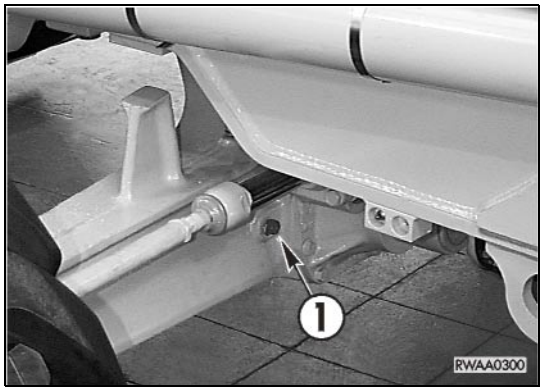
- Perform these operations together with those initiated every 50, 250, and 500 HOURS

CHANGING FRONT 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 in force.**

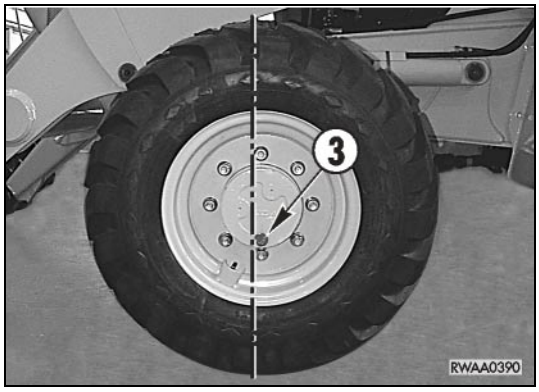
Perform this operation with the machine positioned on level ground and at operating temperature, so that the oil becomes fluid and can be easily drained, which facilitates the elimination of any suspended solid particles.



DIFFERENTIAL

1. Remove drain plug (2) and let the oil flow out completely. Collect it in a container with suitable capacity. While the oil flows out, remove plug (1). Use a 17 mm wrench.
2. Once the oil has been drained, reinstall plug (2) and pour oil of the prescribed type through hole (1), until the level corresponding to the lower edge of the hole itself is reached.
3. Reinstall plug (1).

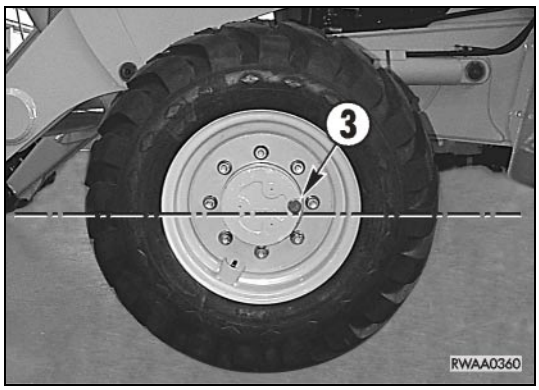
PLANETARY



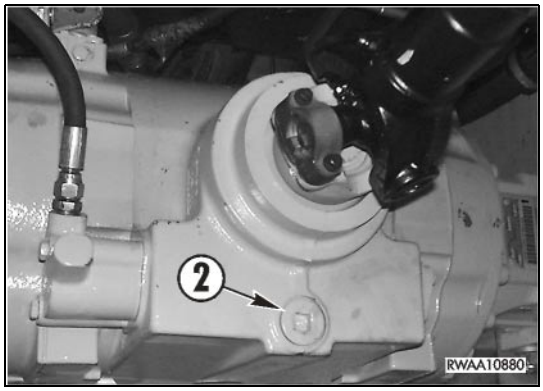
1. Move the machine until plug (3) is in a low position on the vertical axis.
2. Remove plug (3) and let the oil flow out, Collect it into a container with suitable capacity, using a 17 mm wrench.
3. Once oil has been drained, move the machine until plug (3), which serves also as level indicator, is positioned on the horizontal axis.
4. Pour oil of the prescribed type through the hole until the lower edge of the hole itself is reached.
5. Reinstall plug (3).

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

★ Always use oil of the prescribed type. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).



CHANGING THE REAR AXLE OIL

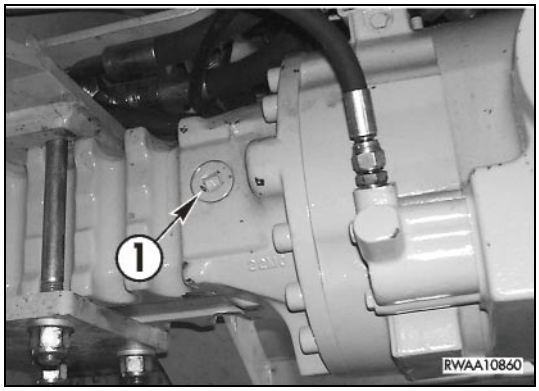


⚠ WARNING

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

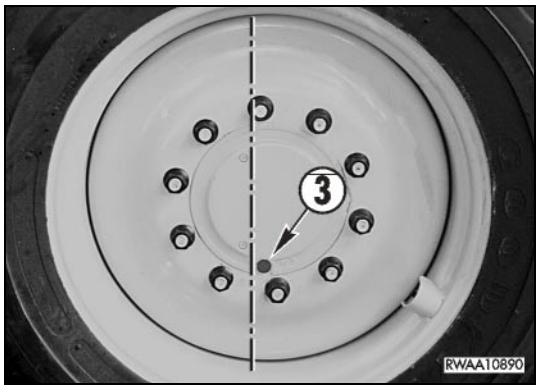
Perform this operation with the machine positioned on level ground and at operating temperature, so that the oil becomes fluid and can be easily drained, which facilitates elimination of any suspended solid particles.

DIFFERENTIAL

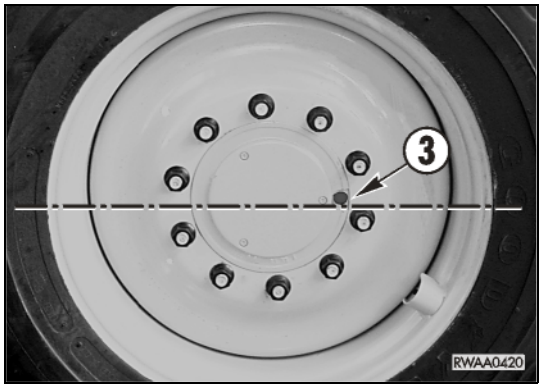


1. Remove drain plug (2) and let the used oil flow out completely, collect it in a container with suitable capacity. While the oil flows out, remove plug (1), using a 1/2” square wrench.
2. Once the oil has been drained, reinstall plug (2) and pour oil of the prescribed type through hole (1), until level corresponding to lower edge of the hole itself is reached.
   - ★ With this operation both axle shafts are filled with oil; before checking level definitively and putting back the plug, wait a few minutes, in order to permit the uniform distribution of oil.
3. Install plug (1).

PLANETARY



1. Move the machine until drain plug (3) is in low position on the vertical axis.
2. Remove plug (3) and let used oil flow out, collect it into a container with suitable capacity, using a 1/2” square wrench.
3. After draining oil, move the machine until plug (3) that serves also as level indicator is positioned on the horizontal axis.
4. Pour oil of prescribed type through the hole until it reaches lower edge of the hole itself.
5. Reinstall plug (3).

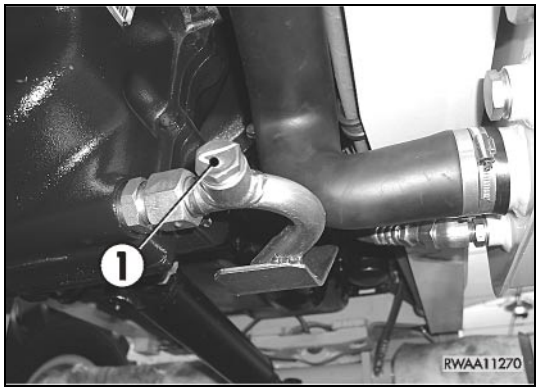


Move the machine both forward and backward and then stop it. Check the levels again. Always use oil of the prescribed type. (See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7).

CHANGING HYDRAULIC TRANSMISSION OIL

⚠ WARNING

- **Perform this operation with the machine parked on level ground and raised loader arm with engaged safety lock.**
- **Hydraulic transmission oil must be drained at operating temperature, which is very high, and may cause serious burns, wear insulating gloves, goggles and safety shoes.**
- **Immediately clean any area dirty with oil.**
- **Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations in force.**



When changing the transmission oil, also change the filter (See "CHANGING HYDRAULIC TRANSMISSION FILTER" on page 3-50).

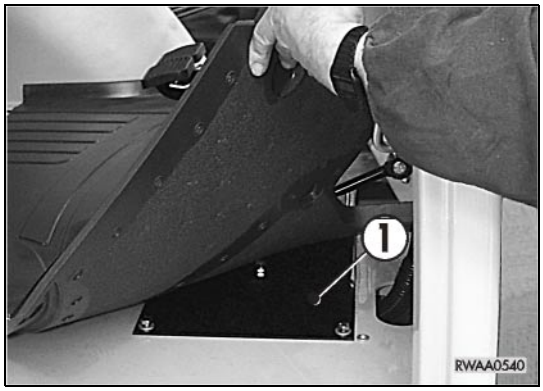
Proceed as follows:

1. Open the engine hood.
2. Remove drain plug (1) and let the oil flow into a container with suitable capacity, using a 27 mm wrench.
3. Carefully remove the filter and replace it. (See "CHANGING HYDRAULIC TRANSMISSION FILTER" on page 3-50).
4. Reinstall plug (1) and pour oil until it reaches the MIN. level on dipstick (**2**).
5. Start engine and let it idle to fill the converter and internal system.
6. While engine is idling, add oil until the MIN. level is reached again.
7. When oil reaches a temperature of approximately 50°C (122°F), add oil until it reaches the MAX. mark. For adding oil, See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7.
8. Close the engine hood.

CHANGING HYDRAULIC TRANSMISSION FILTER

WARNING

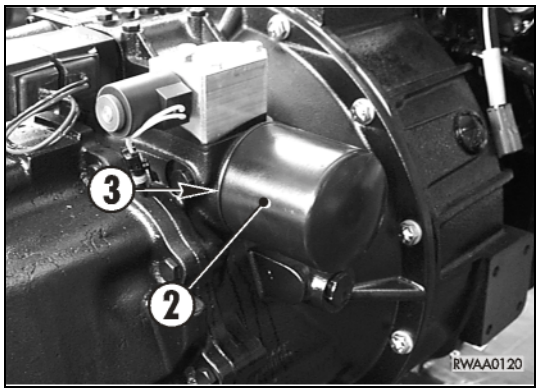
- **After operating machine, the transmission unit becomes very hot and may cause burns. Let the machine cool down before changing the filter.**
- **Oil that may be spilled during replacement of the filter may cause the floor to become slippery: use anti-social shoes and immediately remove any trace of oil from the floor and transmission unit.**
- **Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations in force.**



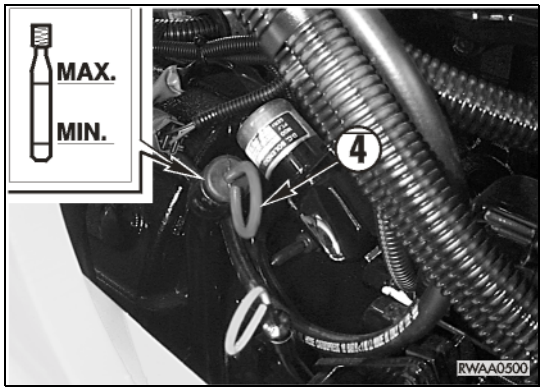
Change the filter every time transmission oil is changed.

Proceed as follows:

1. Raise the front mat and remove cover (1), using a 13 mm wrench.
2. Unscrew and remove filter (2) with the special wrench provided.
3. Clean contact surface between the gasket and filter support (3).
4. Lubricate the gasket, fit it in its seat and screw filter on thoroughly until it touches the gasket.
5. Give it another half turn by hand.
6. Start engine, let it idle and let the oil warm up until it reaches operating temperature.



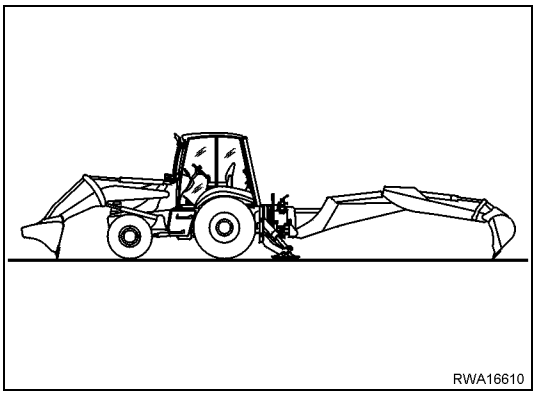
7. Add oil until it reaches the MAX. mark on dipstick (4). (See "CHECKING HYDRAULIC TRANSMISSION OIL LEVEL" on page 3-39). Always top off with suitable oil. (See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7).
8. Reinstall cover (1).



CHECKING AND ADJUSTING ENGINE VALVE CLEARANCE

★ Since the check and adjustment of the engine valve clearance requires use of special tools, have these operations performed by your Komatsu Dealer.

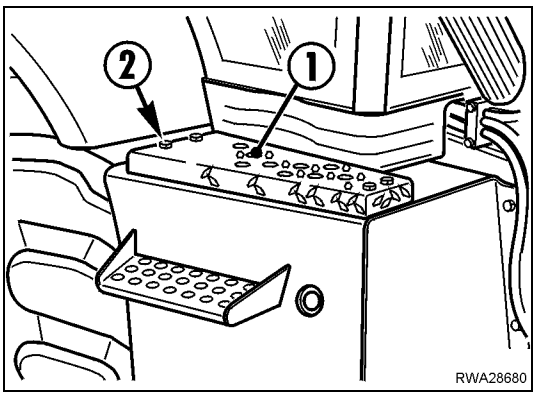
MAINTENANCE EVERY 2000 HOURS OF OPERATION


RWA16610

- Perform these operations together with those to be initiated every 50, 250, 500, and 1000 HOURS.

CHANGING HYDRAULIC SYSTEM OIL AND CLEANING SUCTION FILTER

★ On machines containing synthetic biodegradable hydraulic oil type HEES, replace oil after the first 500 hours of operation and successively every 2000 hours, or at least once a year.



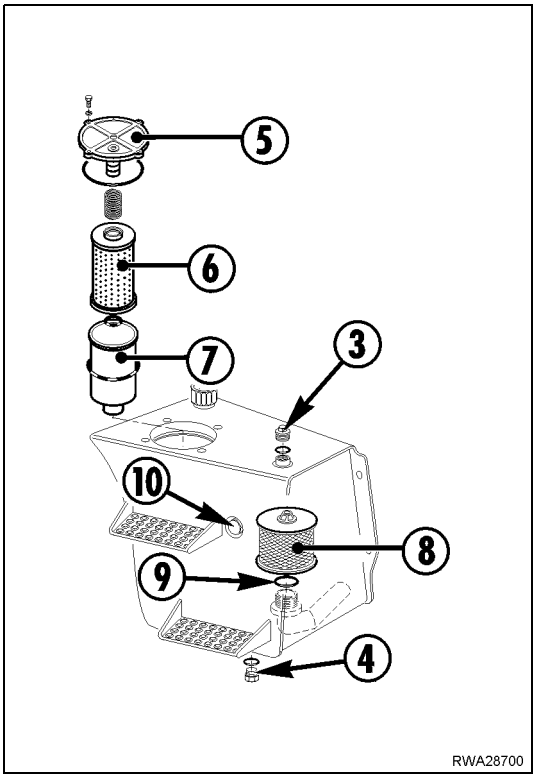
RWA28680

⚠ WARNING

- **After stopping engine, with the machine positioned so that maintenance can be performed (see fig.), release residual pressures from the work equipment system (by operating the controls more than once) and from the tank (by slowly loosening the filler cap).**
- **Let the oil cool down until it reaches 40-45°C (104-113°F) before performing any maintenance.**
- **Immediately clean any area dirty with oil.**
- **Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations in force.**

The filter can be reached after removing fastening screws (2) and platform (1), using a 17 mm wrench.

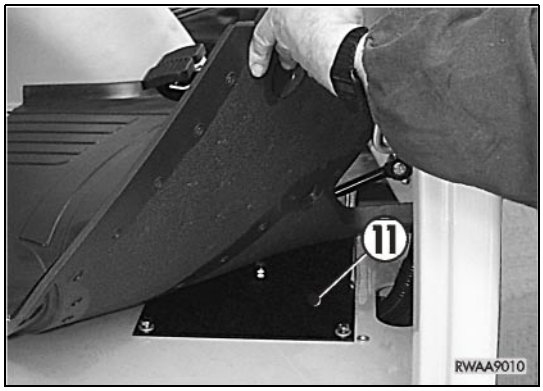
1. Remove filler cap (3), using a 24 mm wrench.
2. Remove drain plug (4) and let the oil flow out. Collect it in a container with suitable capacity, using a 41 mm wrench.
3. Remove upper flange (5), filter cartridge (6), and filter casing (7), using a 13 mm wrench.
4. Remove strainer filter (8), complete with gasket (9) and clean it with light solvents (petrol, kerosene, diesel oil, etc.).
   ★ Carefully check the filter element and if it is not in perfect condition, replace it.
5. Reinstall filter (8) complete with gasket (9).
6. Replace filter cartridge (6) and reassemble the whole unit. (See "CHANGING HYDRAULIC SYSTEM OIL FILTER" on page 3-43).
7. Reinstall drain plug (4) and fill oil tank with the prescribed oil until it reaches the proper level at (10).

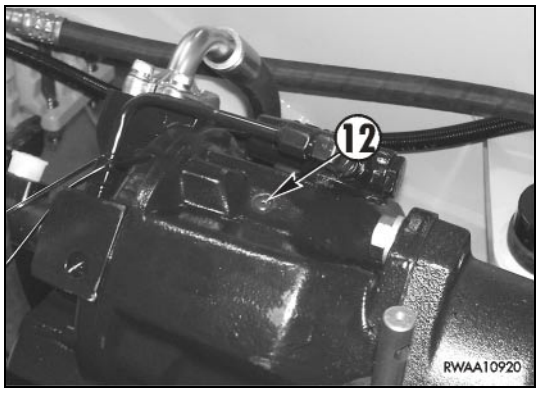


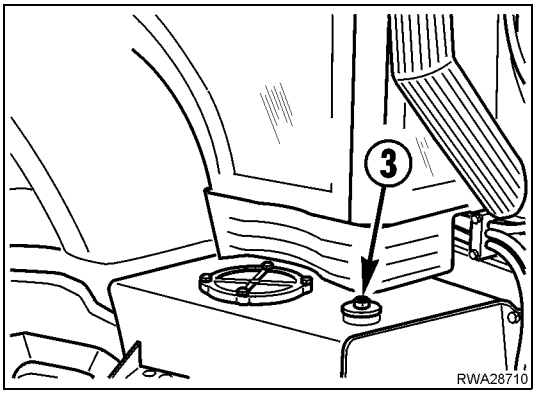
RWA28700

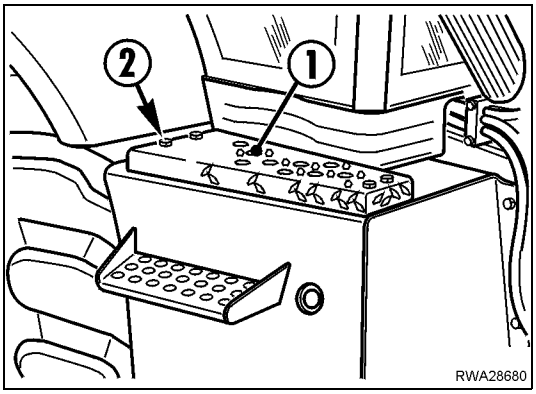
8. Raise the front mat and remove cover (11), using a 13 mm wrench.
9. Loosen bleeder plug (12) located on the hydraulic pump, until no air bubbles can be observed in the oil that flows out (use a 3 mm setscrew wrench). Tighten bleeder plug (12) and reinstall cover (11).
10. Reinstall filler cap (3). Start engine and operate the machine making each piston move several times in order to bleed the system. Stop machine in the maintenance position, check oil level again and if necessary, add oil. Always use oil of the prescribed type, (See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7).
11. Put back the upper platform (1) with relevant fastening screws (2).

★ Do not start engine with an empty tank, since this would certainly damage the pump.



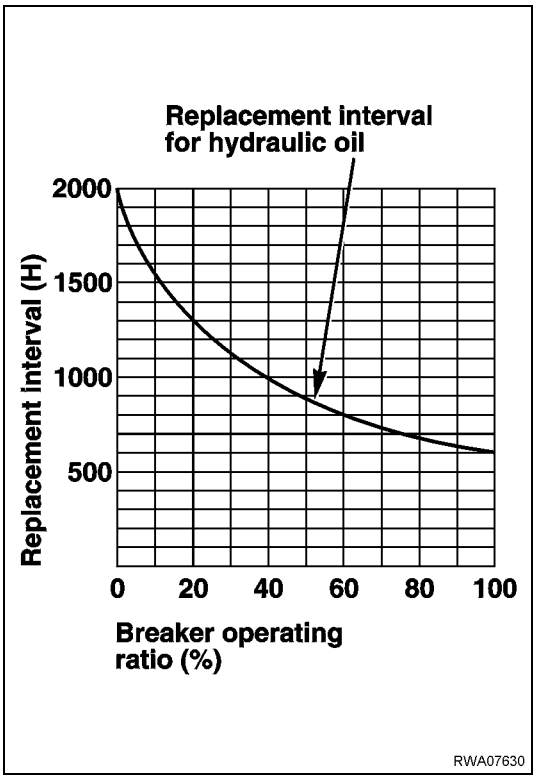






★ Hydraulic oil of the machines equipped with demolition hammer deteriorates more rapidly than oil of the machines used for simple digging operations.

★ Perform oil changes as scheduled on the accompanying table.

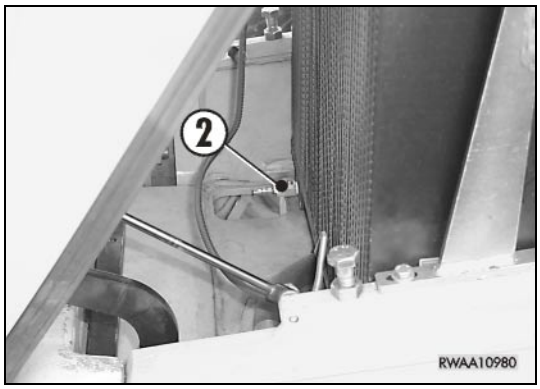


CHANGING COOLANT

⚠ WARNING

- **After the machine has been operated, coolant is very hot and under pressure and it may cause serious burns. Let the engine cool down until it reaches approximately 40-45°C (104-113°F) before changing the coolant.**
- **Slowly loosen radiator cap, in order 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 anti-pollution regulations in force.**

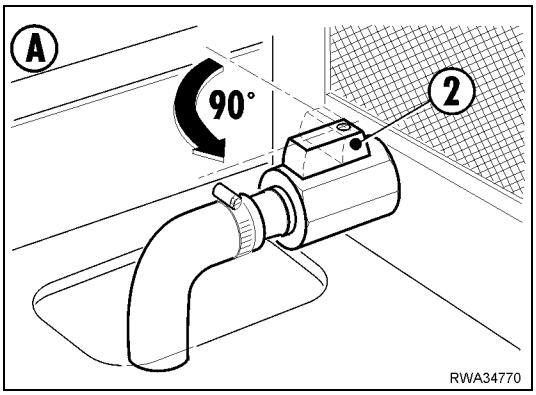
The following operations refer to changing permanent coolants, if the coolant is water or water with antifreeze, which are used according to the season, it is necessary to flush the cooling system in order to eliminate any encrustation. (See "FLUSHING COOLING SYSTEM" on page 3-59).



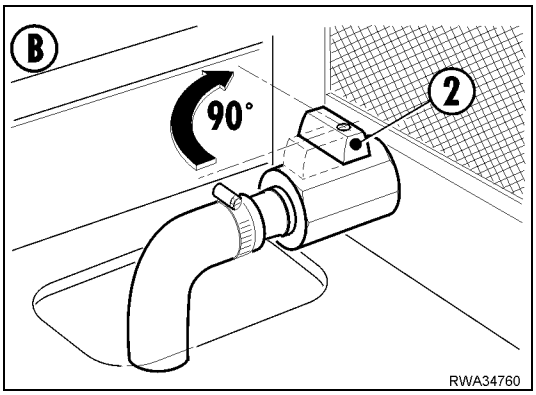
1. Open engine hood.

2. Loosen and remove upper radiator cap (1).

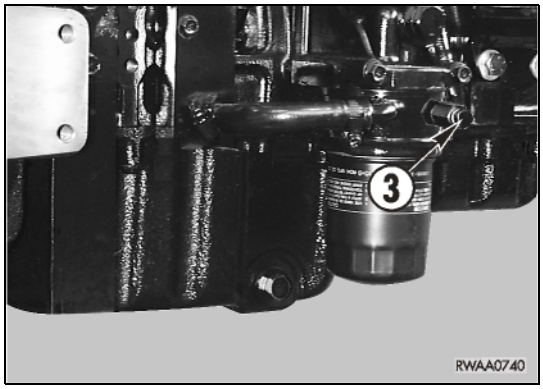
3. Open radiator drain cock (2) (see fig.A), loosen drain valve (3) positioned on the filter carrier head. The coolant will flow out, collect it in a container with suitable capacity. Use a 12 mm wrenches.



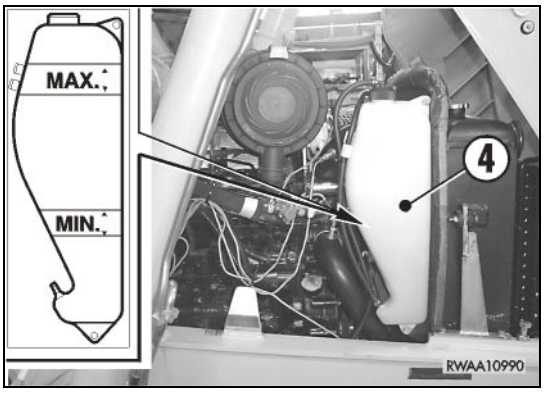
4. Close radiator drain cock (2) (see fig.B), tighten valve (3) on the filter carrier head, and fill the radiator with new coolant. (See "FUEL, COOLANT, AND LUBRICANTS" on page 3-7).



5. Start engine and let it idle for a few minutes; check the coolant level again. Add coolant, if necessary. Reinstall upper radiator cap (1).



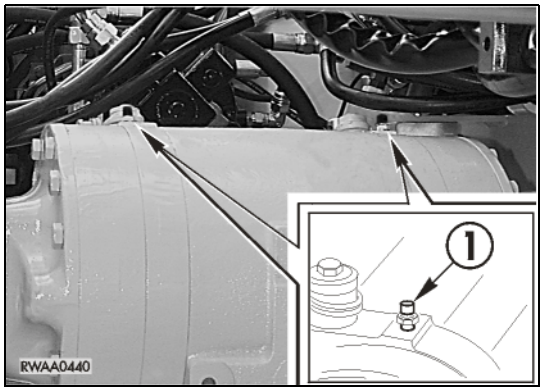
6. Fill expansion tank (4) until the maximum level is reached, then close the engine hood.

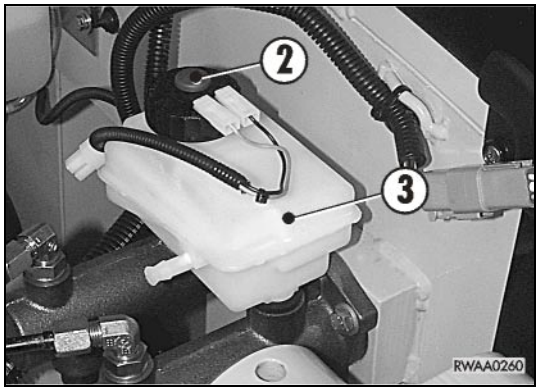


CHANGING THE BRAKING SYSTEM OIL

⚠ WARNING

- **Oil spilled on the floor may cause it to become slippery; immediately clean any dirty area.**
- **Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations in force.**





Before changing braking system oil, it is advisable to brake a few times in order to warm the oil up to raise viscosity to facilitate draining. Changing oil and bleeding the brake system must be done with the machine positioned on level ground with the parking brake set. To drain oil and bleed the system, proceeding as follows:

1. Attach a small hose (for collection of the oil) to drain screws (1) and loosen them, using a 13 mm wrench.
2. Open the engine hood and remove cap (2) from tank (3).
3. Operate the tandem brake pedals (connected to each other) until oil in tank (3) runs out.
4. Fill tank (3) with new oil and keep pumping. Fill tank (3) more than once, until the used oil (about 0.8 liters {1.7 US pint}) has been completely purged, Bleed the residual air. (See “BLEEDING BRAKE SYSTEM” on page 3-58). For details on oil to be used, See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7.

CHECKING ALTERNATOR AND STARTER

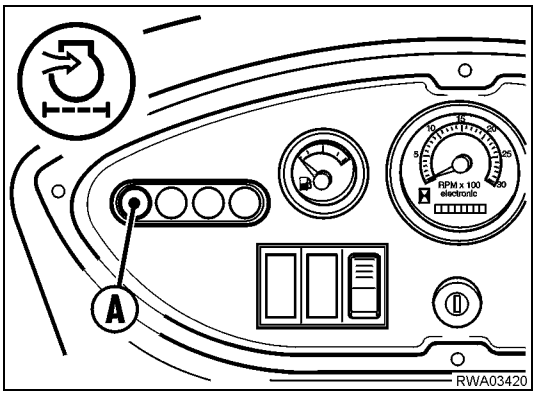
- For any inspection and/or repair, contact your Komatsu Dealer.
- If the engine is started frequently, have inspection done every 1000 hours of operation.

WHEN REQUIRED

CHECKING, CLEANING, OR CHANGING AIR CLEANER CARTRIDGE

⚠ WARNING

- **Remove the air cleaner only after stopping engine, and do not start engine after the air cleaner is removed.**
- **Always wear safety goggles during cleaning operations.**

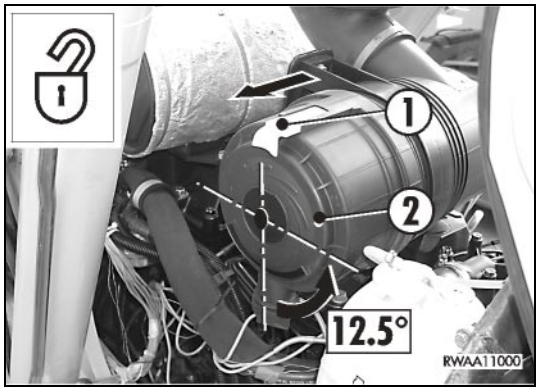


★ The air filtering system consists of a primary filtering element with considerable capacity and of a secondary cartridge that ensures additional safety protection.

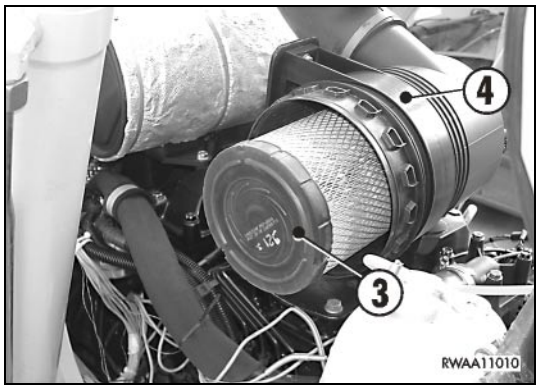
★ The primary element can be cleaned with compressed air, while the cartridge must be replaced.

★ The filter must be cleaned when the clogging warning light (A) positioned on the side dashboard comes on or flashes.

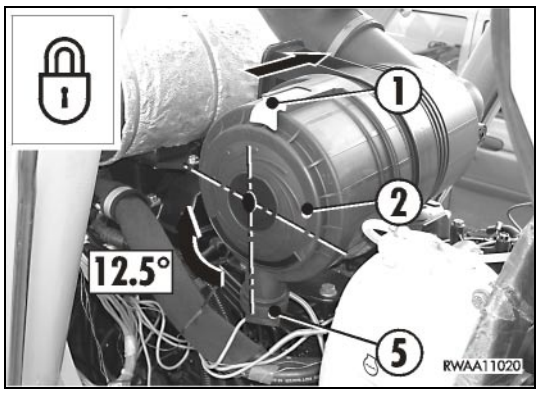
The air cleaner can be reached after raising the loader arm, engaging the mechanical safety lock and opening the engine hood.
To clean the primary element, proceed as follows:



1. Release safety lock (1), moving it toward the outside.
2. Rotate cover (2) counter-clockwise approximately 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, and blow compressed air on the inner surface, keeping the air jet at a distance of approximately 15 cm (5.9 in) and taking care to prevent pressure from exceeding 4-5 bars (58-73 psi).
5. Carefully clean the inside of filter case (4), taking care to prevent foreign debris from getting into the suction duct.
6. Reinstall filter element (3), making sure that it is perfectly seated in its housing.

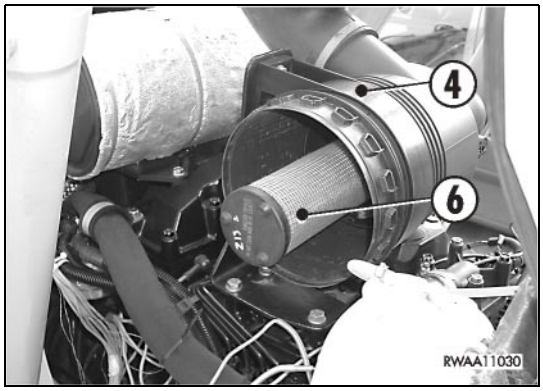


7. Reinstall cover (2), rotating it clockwise approximately 12.5°. Make sure that cover (2) is perfectly locked and that ejector (5) is positioned vertically on the lower part.
8. Once the unit has been reassembled, push safety lock (1) towards the inside.
   - ★ If clogging warning light comes on after starting the engine, it is necessary to replace the primary filtering element and safety cartridge.
   - ★ Replace primary filter element after 6 cleaning operations or after one year. Every time the primary filtering element is replaced, the safety cartridge must also be replaced.



To change the safety cartridge, after removing the primary element, proceed as follows:

1. Remove safety cartridge (6) and replace it with a new one.
2. Once safety cartridge (6) has been installed inside filter case (4), make sure that it is perfectly seated in its housing.
3. Reassemble the unit as described above, making sure that all filter components are perfectly locked.
4. Push safety lock (1) towards the inside.

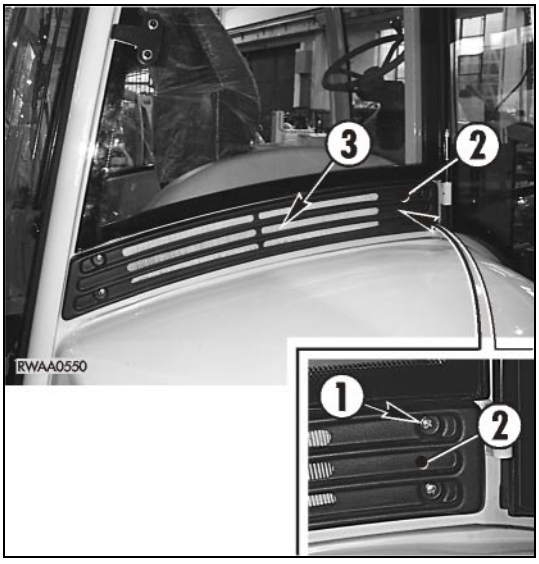


CHECKING AND CLEANING CAB AIR FILTERS

WARNING

- **Always wear safety goggles during cleaning operations.**

Air suction for ventilation of the cab is protected by a filter positioned on right side of the cab. This filter blocks all impurities contained in the air and must be cleaned whenever a decrease in air circulation is observed.
The filter can be reached from outside of the cab. To clean the filtering element, proceed as follows:

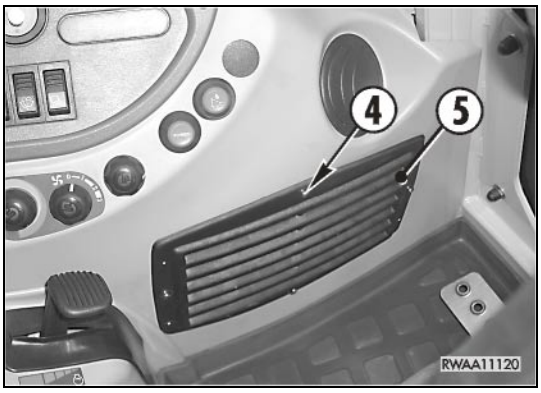


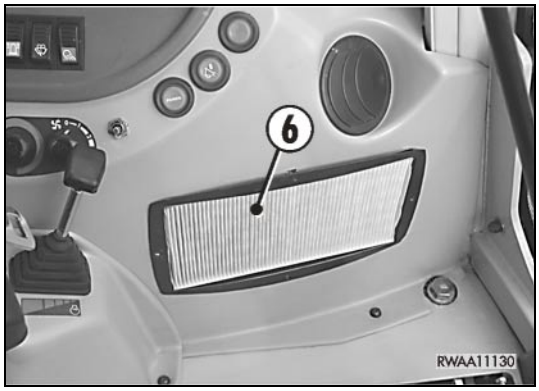
1. Remove screws (1), remove external protection (2), and remove filter element (3).
2. Tap element lightly on the palm of your hand to remove dust. Blow compressed air on its surfaces, keeping the jet at a distance of about 15 cm (5.9 in), making sure that pressure does not exceed 4-5 bars (58-73 psi).
3. Carefully clean the filter casing, taking care to prevent any foreign debris from entering the suction duct, and then reassemble the unit.

If the machine is equipped with air conditioning as well as external filter (3) there is also an additional internal filter (6) for internal air recirculation. This is a filter that holds the impurities present in the air and it must be cleaned whenever a decrease in the air circulation is observed. The filter can be reached from inside the cab. To clean the filter element, it is necessary to proceed as follows:

1. Remove screws (4), remove outer guard (5), and remove filter element (6).
2. Tap element lightly on the palm of your hand to remove dust and blow compressed air on its surfaces, keeping the jet at a distance of about 15 cm (5.9 in) and making sure that the pressure does not exceed 4-5 bar (58-73 psi).

3. Carefully clean the filter casing, taking care to prevent any foreign debris from entering the suction duct, and then reassemble the unit.

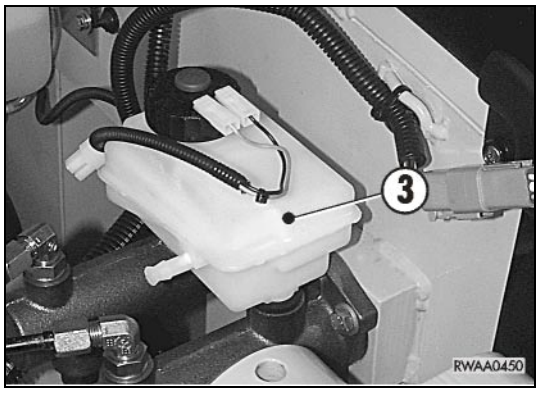




BLEEDING BRAKE SYSTEM

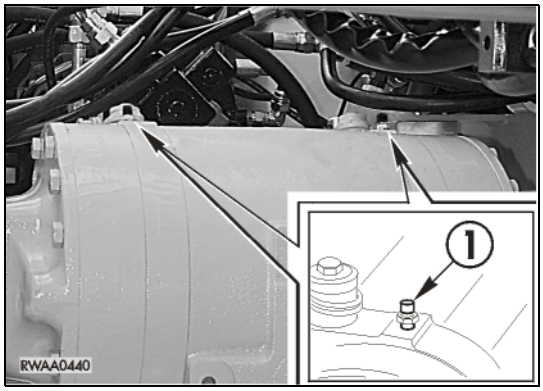
WARNING

- **Oil spilled on the floor may cause it to become slippery; immediately clean any dirty area.**
- **Oils, filters, coolant, and the battery are considered special waste and must be collected and disposed of according to all anti-pollution regulations in force.**



This operation is important, since it helps maintain the power and braking efficiency of the machine. Proceed as follows:

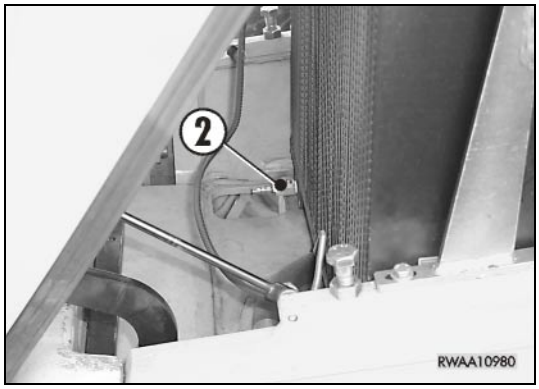
1. Make sure that oil in braking system tank (3) reaches the maximum level.
2. Depress each brake pedal and keep it depress while loosening drain screw (1) for each brake, until pedal reaches the end of its stroke. Use a 13 mm wrench.
3. Keep pedal at the end of its stroke while tightening drain screw (1).
4. Release the brake pedal, wait for a few minutes and repeat operations described above until no air bubbles can be seen in the oil that flows out of drain screw (1).
   - ★ When bleeding the system, attach a small hose to screws (1), In order to collect the oil.
   - ★ Bleeding must be carried out for both braking units, disconnecting the tandem pedals from each other.
   - ★ Frequently check oil level in the brake system tank and top off whenever oil is near the minimum level.
   - ★ When adding oil, use only new oil of the prescribed type, See “FUEL, COOLANT, AND LUBRICANTS” on page 3-7.



FLUSHING COOLING SYSTEM

WARNING

- **Be extremely careful when performing this maintenance operation. Since the engine must be running, one operator must remain on the machine and another operator helping after they decide on words and signals to use.**
- **After work, when the machine is stopped, the coolant is very hot and under pressure and may cause serious burns. Let the engine cool down until it reaches approximately 40-45°C (104-113°F) before starting the flushing operations.**

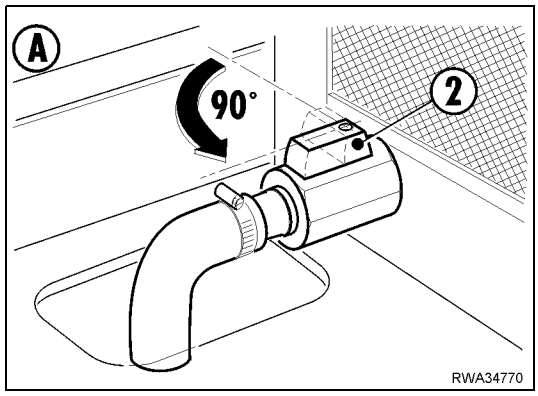


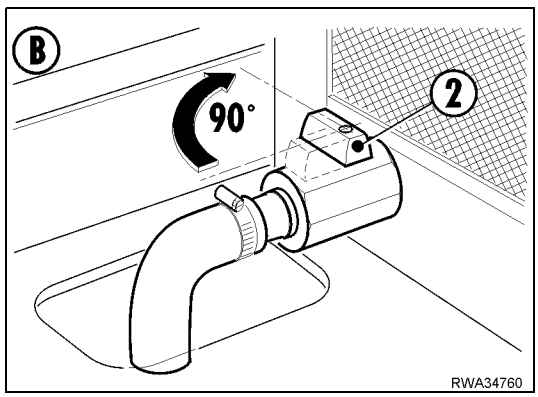
WARNING

- **Slowly loosen the radiator cap, to release residual pressure.**
- **Engage all work equipment safety locks. Apply 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 anti-pollution regulations in force.**

Whenever changing from water to using antifreeze fluids, and vice versa, it is necessary to flush the system in order to eliminate either oxide deposits or limestone encrustations. Proceed as follows:

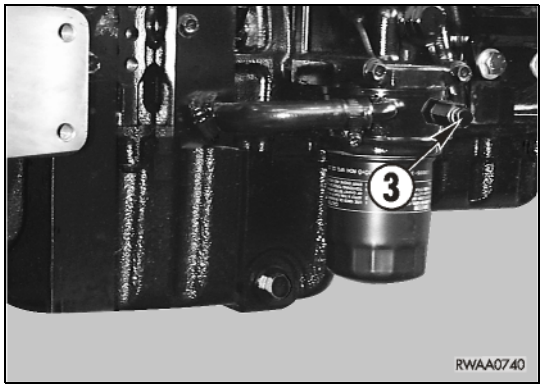
1. Open the engine hood.
2. With the fluid still warm, open radiator drain cock (2) (see fig. A), loosen drain valve (3) positioned on the filter carrier head and loosen radiator cap (1), using a 12 mm wrench.
3. Let all the fluid flow out. Tighten valve (3) on the filter carrier head engine and close radiator drain cock (2) (see fig. B).
4. Pour a high-quality scale remover into the radiator, in doses recommended on the package (remember that the capacity of the cooling system is approximately 14 liters (3.7 US gal). Fill the radiator with water.
5. Start engine and let it run at high rpm for about 15 minutes.
6. Reduce the rotation speed to idling and drain the scale removing solution through radiator drain cock (2) (see Fig. A). At the same time, fill radiator with running water for at least 40 minutes.
7. Stop engine, let all the water flow out, close radiator drain cock (2) (see fig. B), and fill the system with coolant.
8. Start engine and after a few minutes check the fluid level in the radiator, if necessary, add more coolant before tightening cap (1).

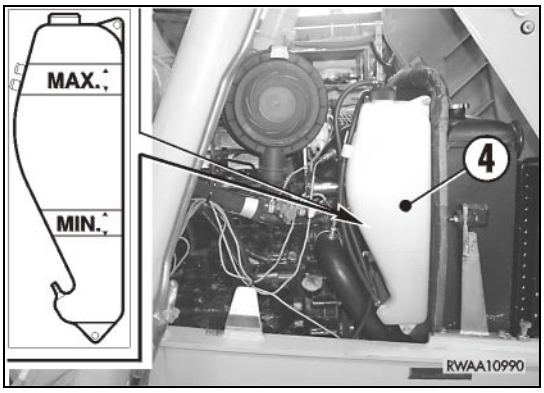




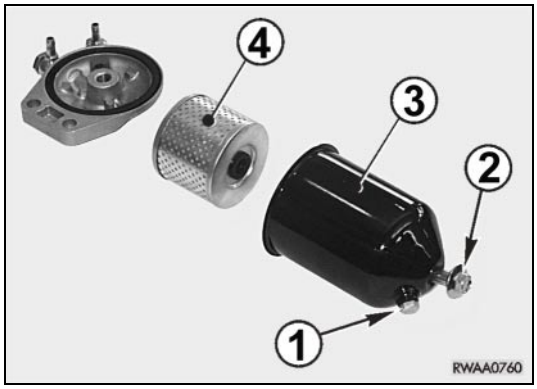
9. After draining the water from expansion tank (4), flush the tank's inside and fill it with coolant until a level between the MIN. and MAX. marks is reached.
10. Close the engine hood.

★ The cooling system must be flushed more frequently if the water used contains a high quantity of calcium salts (if the water is very hard).



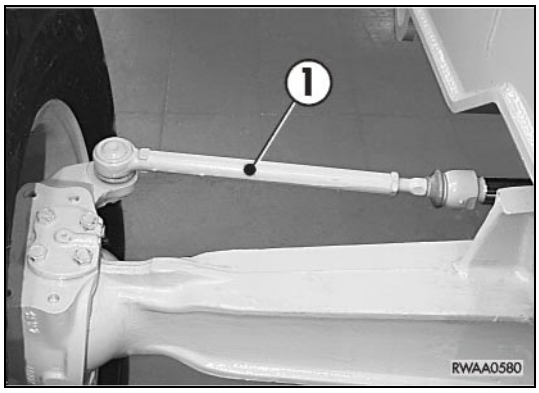


CLEANING THE WATER SEPARATOR

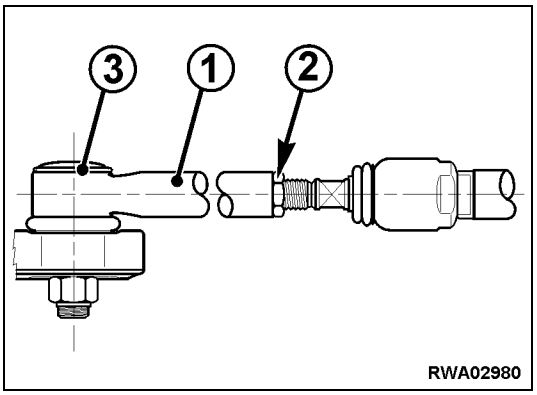


1. Loosen screw (1) and drain the contained in the water separator, collect it in a container with suitable capacity. Use a 13 mm wrench.
2. Loosen central screw (2), remove bowl (3), and filter element (4). Use a 14 mm wrench.
3. Clean inside of the pan and filter with diesel oil or oil.
4. Reinstall filter (4), bowl (3), tighten screws (2) and (1), and bleed the fuel supply circuit proceeding as described in chapter See "CHANGING FUEL FILTER" on page 3-44.
   - ★ If the filter element is excessively clogged or damaged, replace it.
5. Start the engine.

CHECKING AND ADJUSTING FRONT WHEEL TOE-IN



This check must be done according to time intervals scheduled by the operator, since any abnormality regarding the wheel toe-in is due to impacts or vibrations, depending on type of surface which the machine works.
Another reason for performing this check is to examine the front tires for excessive wear.
The machine has been designed with a toe-in equal to 0 mm.
Every adjustment must restore this value and must be carried out on tie rods (1) after loosening nuts (2) that lock them. (Use 27 and 19 mm wrenches).
During this check and the relevant adjustment, it is advisable to also check conditions of ball joints (3). If considerable slack is observed, immediately replace them.



CHECKING AND ADJUSTING PARKING BRAKE

WARNING

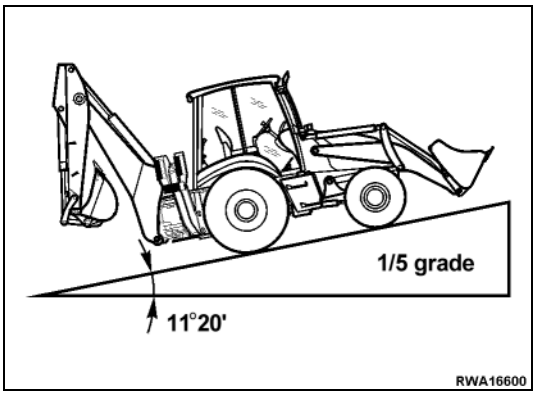
During running-in, check efficiency of parking brake after the first 500 hours of operation.

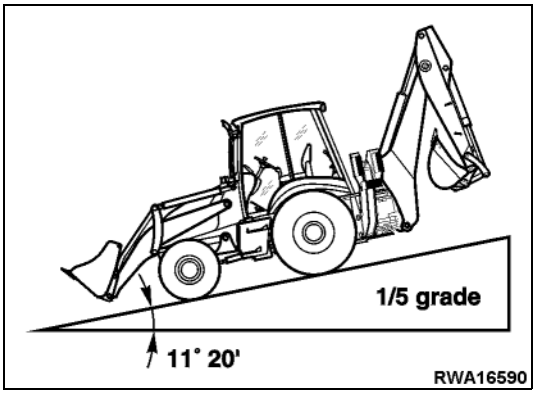
CHECK

Check condition:

- Tire pressure as prescribed.
- Dry, compact road surface, with approximately 11° 20’ (1/5) grade.
- Machine in operating conditions.

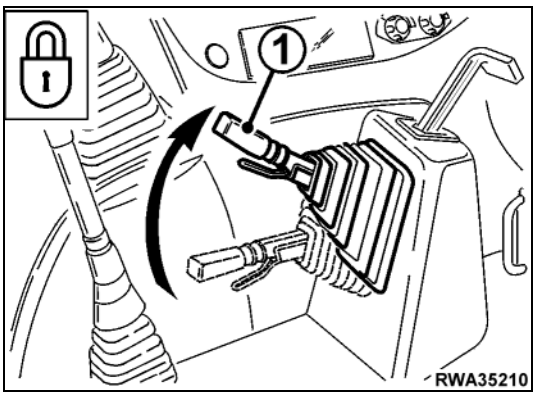
1. Start the engine.
2. Align the machine in a straight traveling position and proceed up the slope with 1/5 grade, with bucket empty.
3. Stop the machine by applying brake pedal, shift directional control lever to neutral position (N), and stop the engine.
4. Apply the parking brake (lock position), slowly release the brake pedal, and make sure that the machine does not move.

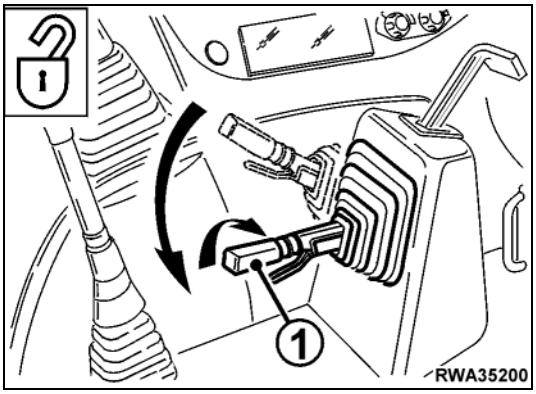




ADJUSTMENT

1. With engine off, release the brake lever and rotate lever end (1) by giving it 2 or 3 counter-clockwise turns.
2. Start the engine and check again.

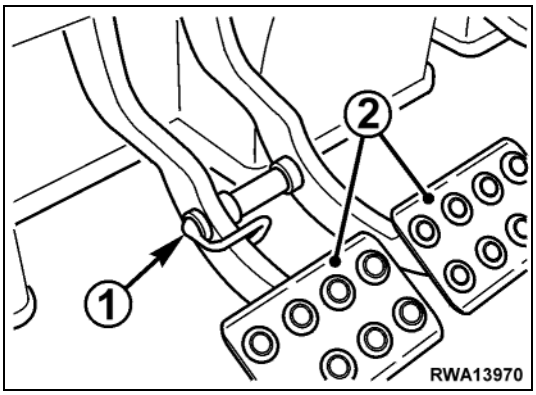




CHECKING THE BRAKING EFFICIENCY

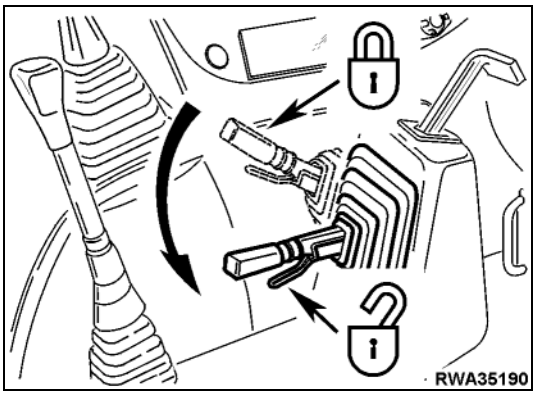
★ During running-in, check the braking efficiency after first 100 hours of operation.

★ Perform check with the machine positioned on firm and flat ground, making sure that there are no people or obstacles in the vicinity.

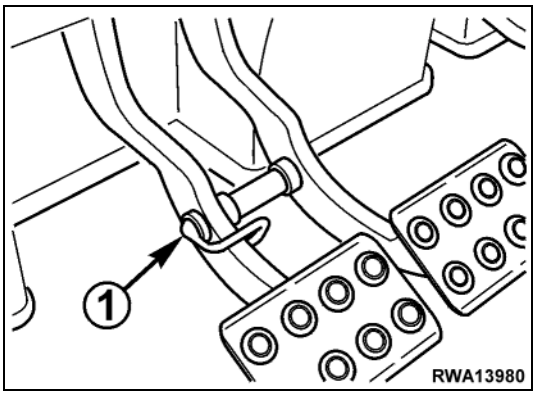


This check must be carried out after setting the work equipment in travel or transport position, and engaging all safety locks.

1. Connect tandem brake pedals (2) with pin (1).
2. Start the engine and release parking brake.
3. Engage 2nd gear and forward gear.
4. Accelerate until reaching the maximum speed.
5. Press the brake pedals. The machine must brake smoothly on a straight line and the tension of pedals must be constant. Otherwise, contact your Komatsu Dealer.

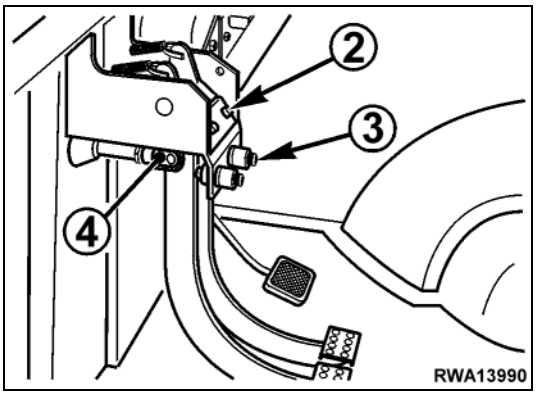


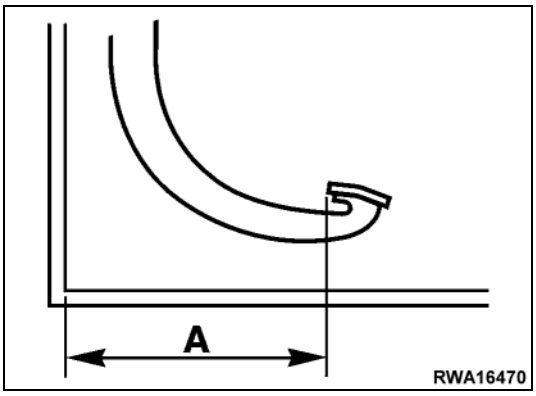
CHECKING AND ADJUSTING BRAKE PEDAL STROKE



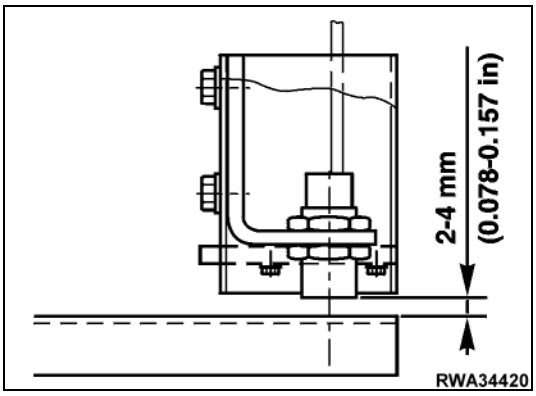
Perform this check when working on adjusting the brake pedal stroke to eliminate or prevent any problems.
To check and adjust the brake pedal stroke, proceed as follows:

1. Insert connection pin (1) in order to couple the pedals.
2. By adjusting the end-of-stroke rubber pads (2), position the pedals in correspondence with measure “A”= 325 mm (12.8 in); secure the pads in this position. (Use a 13 mm wrench).
3. Lower the pedals to measure “A” 306 mm (12 in); adjust position of microswitches (3) by bringing them near the pedals and lock them. (Use a 17 mm wrench).
4. Again, lower the pedals to measure 294 mm (11.6 in) at “A” and adjust brake pump rods (4) until they touch the pumping pistons, lock them in this position. (Use a 22 mm wrench).





ADJUSTING AUTOMATIC RETURN OF FRONT BUCKET TO THE DIGGING POSITION



The device for automatic return of front bucket to the digging position automatically brings the front bucket to loading position when it is lowered to the ground. The sensor is positioned on right dumping cylinder and determines the horizontal position of the bucket in relation to the ground after bucket dumping control has reached end of stroke and electromagnet of the distributor rod has been operated (See “FRONT END LOADER CONTROLS” on page 2-16).
The sensor must be positioned at a distance of 2-4 mm (0.078-0.157 in) from the sliding rod.

MAINTENANCE INTERVALS IN CASE OF DEMOLITION HAMMER USE

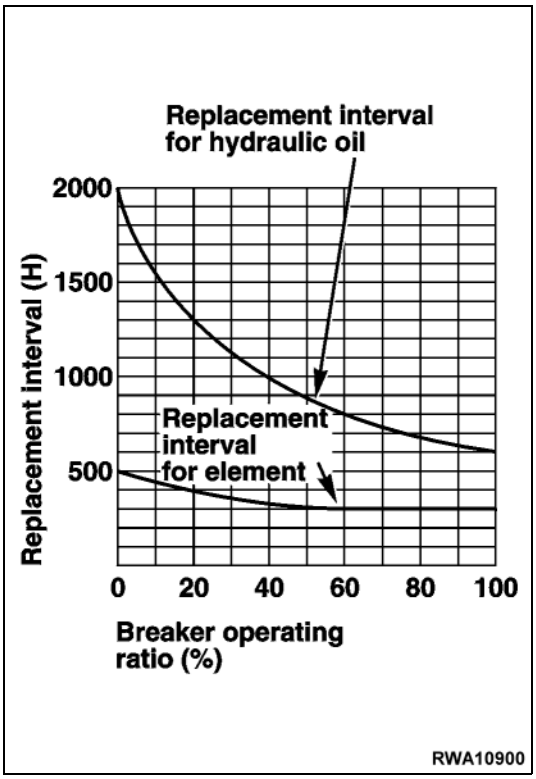
Hydraulic oil used in the machines provided with demolition hammer deteriorates more quickly than oil used in normal digging machines, therefore it is advisable to consult the following maintenance plan.

CHANGING HYDRAULIC OIL FILTER

For new machines, change the filter after the first 100 and 150 hours of operation and for successive changes, adhere to the schedule provided on table to the right.
If the machine contains synthetic biodegradable oil type HEES, the filter must be changed after the first 50 hours of operation.

CHANGING HYDRAULIC OIL

Change hydraulic oil in the tank according to intervals shown on table to the right.
On machines containing synthetic biodegradable oil type HEES, change oil after the first 500 hours of operation, and for successive changes, adhere to the schedule provided on table to the right.



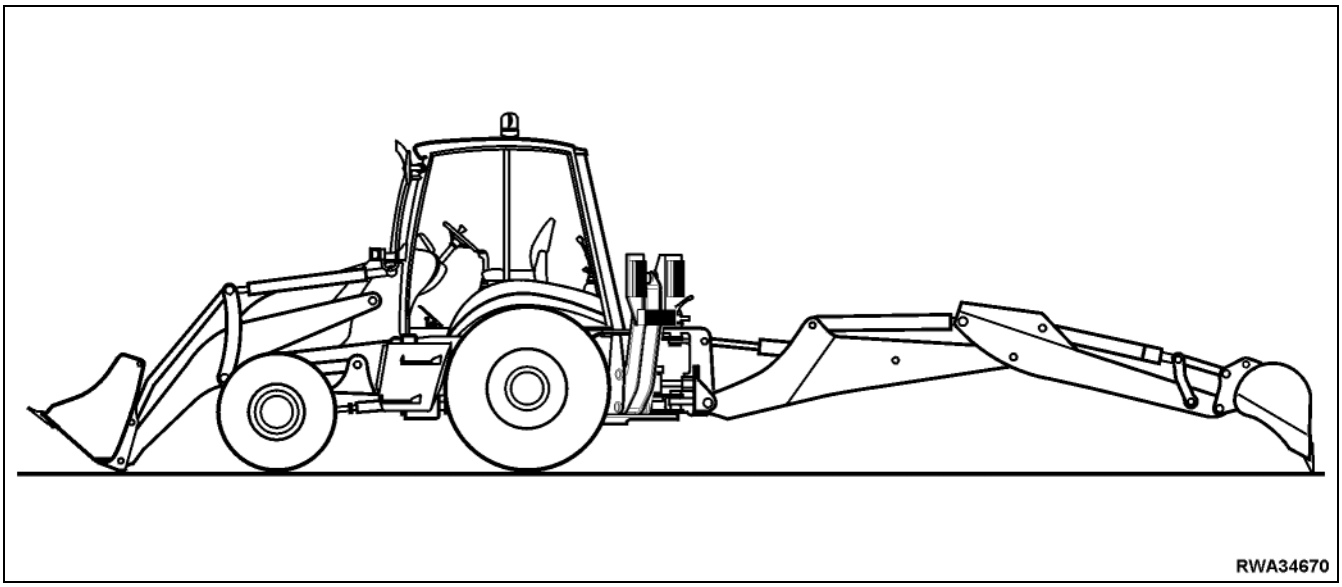
LONG TERM STORAGE

BEFORE STORAGE

⚠ WARNING

When draining the fuel, do not smoke or have exposed flames near machine.
Place a container under the machine to collect fuel and prevent it from spreading.
If some fuel is spilled, clean the dirty surface immediately.

★ To protect cylinder rods when the machine is not used, position work equipment as shown (This serves to prevent cylinder rods from rusting).



If the machine must be stored for a long period of inactivity, it is advisable to put it in a sheltered place and to take the following precautions, in order to keep all its components sound and efficient:

1. Clean the machine thoroughly, repainting it where necessary in order to prevent oxidation.
2. Insert supports under axles to avoid overloading them, and to avoid any deformation of tire sidewalls.
3. Drain and change all fluids of the hydraulic system and lubricants (axles, reduction gears, converter, and engine).
4. Change all filtering elements (air cleaner, engine oil filter, hydraulic system filters, diesel oil filter).
5. Drain the coolant and replace it with a corrosion inhibitor (permanent fluid).
6. Drain the fuel and fill the tank with at least 10 liters (2.6 US gal) of special washing and protecting fuel.
7. Let the engine run for about 10 minutes, to eliminate the residual fuel from the filters, injection pump, and entire fuel supply system. This procedure prevents the injection pump and injectors from seizing. Stop the engine and refuel with diesel fuel.
8. Remove battery, check the electrolyte level and make sure that the battery charge is sufficient. Store battery in a room with suitable temperature and periodically recharge it.
9. Grease the hydraulic cylinder rods.
10. Seal end of the exhaust pipe and fuel tank cap.
11. Move the machine controls to neutral position and engage the mechanical safety locks of the equipment controls.
12. Hang a warning notice on the steering wheel to indicate condition of the machine.
13. Lock the cab doors, fuel tank cap, and engine hood.

DURING STORAGE

WARNING

If it is necessary to carry out a rust-prevention treatment while the machine is kept indoors, open doors and windows to increase ventilation and avoid poisoning by gas.

Start engine and move the machine a short distance once a month, so a new oil film covers all moving parts and surfaces of components. Also, charge the battery if necessary.

AFTER STORAGE

★ If the machine is stored without carrying out the monthly rust-prevention treatment, have maintenance performed by your Komatsu Dealer.

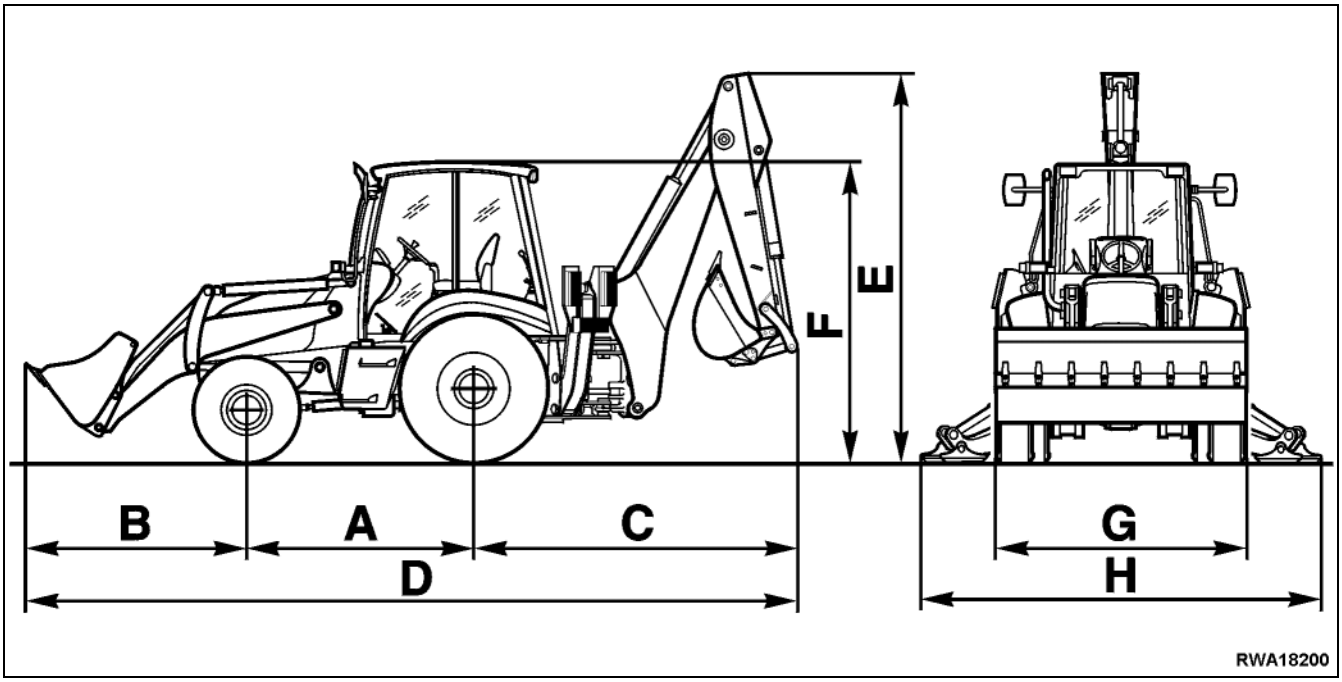
When using the machine after a long period of inactivity, proceed as follows:

1. Remove seals from the exhaust pipe and fuel tank.
2. Check all fluid levels (engine oil, coolant, fuel, hydraulic system oil).
3. Make sure that the battery charge is sufficient and install the battery.
4. Disconnect the engine stop solenoid.
5. Turn ignition key directly to the start position and keep it there until the engine oil pressure warning light goes out. This operation serves to start the circulation of lubricating oil and carry out a first lubrication cycle.
6. Reconnect stop solenoid valve and start the engine. Let engine run at accelerated speed (approximately 1200 rpm) for about 15 minutes.
7. While the engine is warming up, check tire pressure and remove protection grease from the hydraulic cylinder rods.
8. Before moving the machine, make sure that instruments, lights, direction indicators, and brake stoplight work properly.
9. Warm up the hydraulic cylinders, by slowly moving all the work equipment as soon as possible.
10. Move at low speed and brake a few times in order to increase oil viscosity and allow the braking surfaces to seat.

SPECIFICATIONS

TECHNICAL DATA

STANDARD OVERALL DIMENSIONS



Pos.	WB140-2N Standard	WB140-2N Telescopic Arm	WB150-2N Standard	WB150-2N Telescopic Arm
A	2175 mm (7’ 2”)	2175 mm (7’ 2”)	2175 mm (7’ 2”)	2175 mm (7’ 2”)
B	2080 mm (6’ 10”)	2080 mm (6’ 10”)	2080 mm (6’ 10”)	2080 mm (6’ 10”)
C	2945 mm (9’ 8”)	2940 mm (9’ 8”)	3015 mm (9’ 8”)	2940 mm (9’ 8”)
D	7200 mm (23’ 7”)	7195 mm (23’ 7”)	7270 mm (23’ 10”)	7195 mm (23’ 7”)
E	3625 mm (11’ 11”)	3630 mm (11’ 11”)	3625 mm (11’ 11”)	3630 mm (11’ 11”)
F	2750 mm (9’ 0”)	2750 mm (9’ 0”)	2750 mm (9’ 0”)	2750 mm (9’ 0”)
G	2320 mm (7’ 8”)	2320 mm (7’ 8”)	2320 mm (7’ 8”)	2320 mm (7’ 8”)
H	3780 mm (12’ 4”)	3780 mm (12’ 4”)	3780 mm (12’ 4”)	3780 mm (12’ 4”)

TECHNICAL CHARACTERISTICS WB140-2N (ASPIRATED ENGINE)

TOTAL MASS

Minimum total mass . . . . . 7400 kg (16314 lb)
Maximum total mass . . . . . 8800 kg (19400 lb)

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)

ASPIRATED ENGINE

Komatsu diesel engine model 4D106-1FA
Maximum power (2200 rpm EEC 80-1269) . . . . . 61 kw (81.8 HP)
Maximum torque (1500 ±100 rpm EEC 80-1269) . . . . . 310 Nm (229 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 2200 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	Good Year	3.2 bar (46 psi)
Rear	19.5 L24 PR 10	Good Year	2.2 bar (32 psi)

TECHNICAL CHARACTERISTICS WB140-2N (TURBOCHARGED ENGINE)

TOTAL MASS

Minimum total mass . . . . . 7400 kg (16314 lb.)
Maximum total mass . . . . . 8800 kg (19400 lb.)

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)

ASPIRATED ENGINE

Komatsu diesel engine model S4D106-1FH
Maximum power (2200 rpm EEC 80-1269) . . . . . 64.1 kw (86 HP)
Maximum torque (1500 ±100 rpm EEC 80-1269) . . . . . 310 Nm (229 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 2200 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	Good Year	3.2 bar (46 psi)
Rear	19.5 L24, 10 PR	Good Year	2.2 bar (32 psi)

TECHNICAL CHARACTERISTICS WB150-2N

TOTAL MASS

Minimum total mass . . . . . 7400 kg (16314 lb.)
Maximum total mass . . . . . 8800 kg (19400 lb.)

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)

ASPIRATED ENGINE

Komatsu diesel engine model S4D106-1FA
Maximum power (2200 rpm EEC 80-1269) . . . . . 72 kw (96.5 HP)
Maximum torque (1500 ±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 2200 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	Good Year	3.2 bar (46 psi)
Rear	19.5 L24, 10 PR	Good Year	2.2 bar (32 psi)

LIFTING CAPACITIES

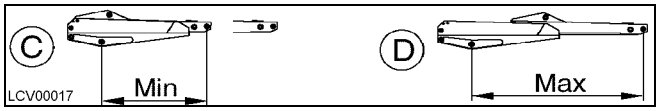
⚠ WARNING

- **Carry out lifting operations only with the machine positioned on firm level ground.**

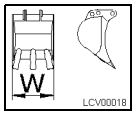
SYMBOLS

A - Standard arm length . . . . . L = 1850 mm (72.8 in)
B - Longer arm length . . . . . L = 2150 mm (84.6 in)

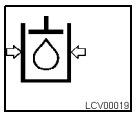
C - Telescopic arm completely retracted
. . . . . .L = 1850 mm (72.8 in)
D - Telescopic arm completely extended
. . . . . .L = 2150 mm (84.6 in)



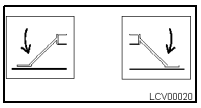
E - Standard backhoe bucket width and mass . . . . . W = 600 mm (23.6 in) / 160 kg (353 lb.)



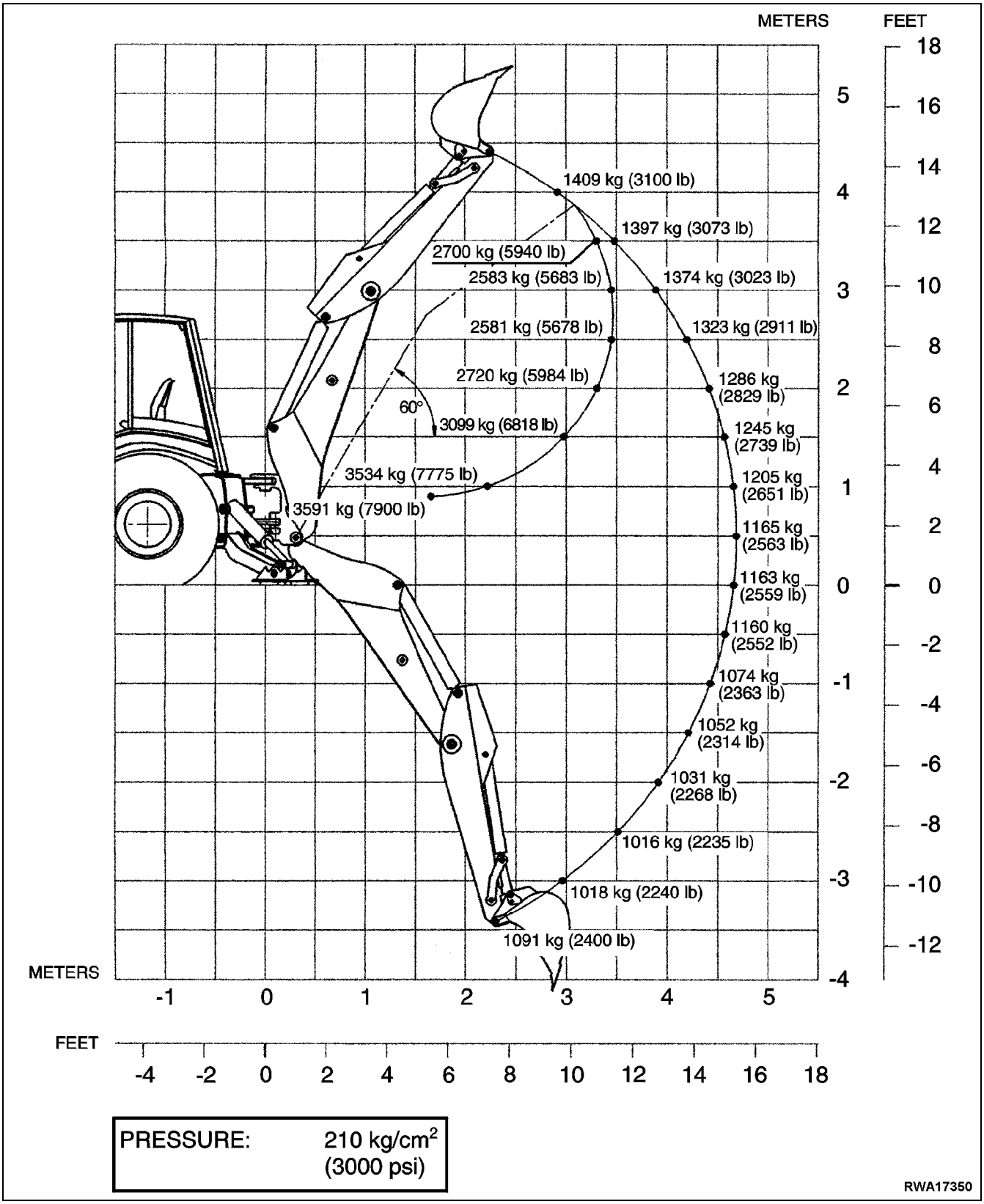
F - Operating hydraulic pressure. . . . . .

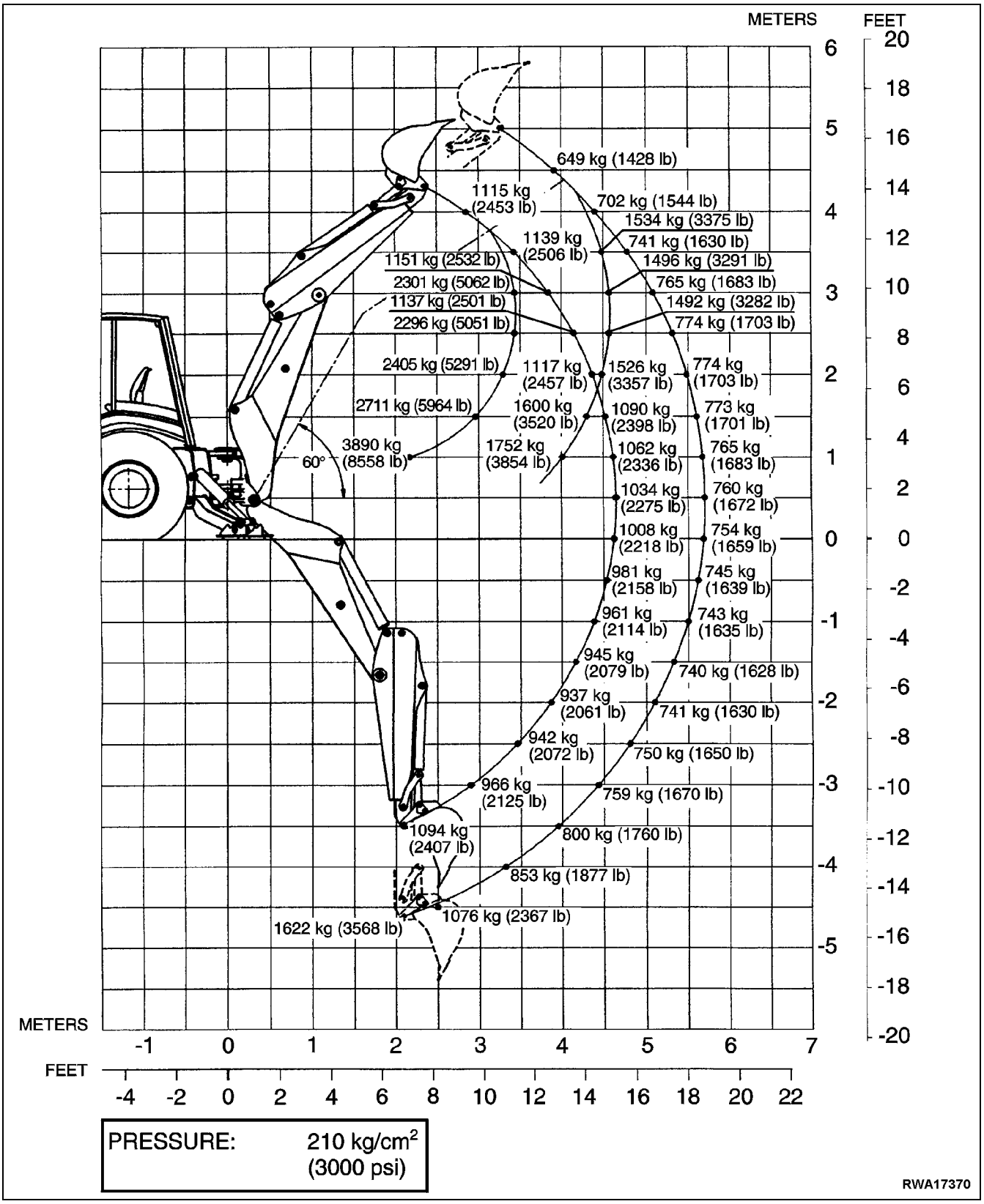


G -Lowered stabilizers . . . . . .

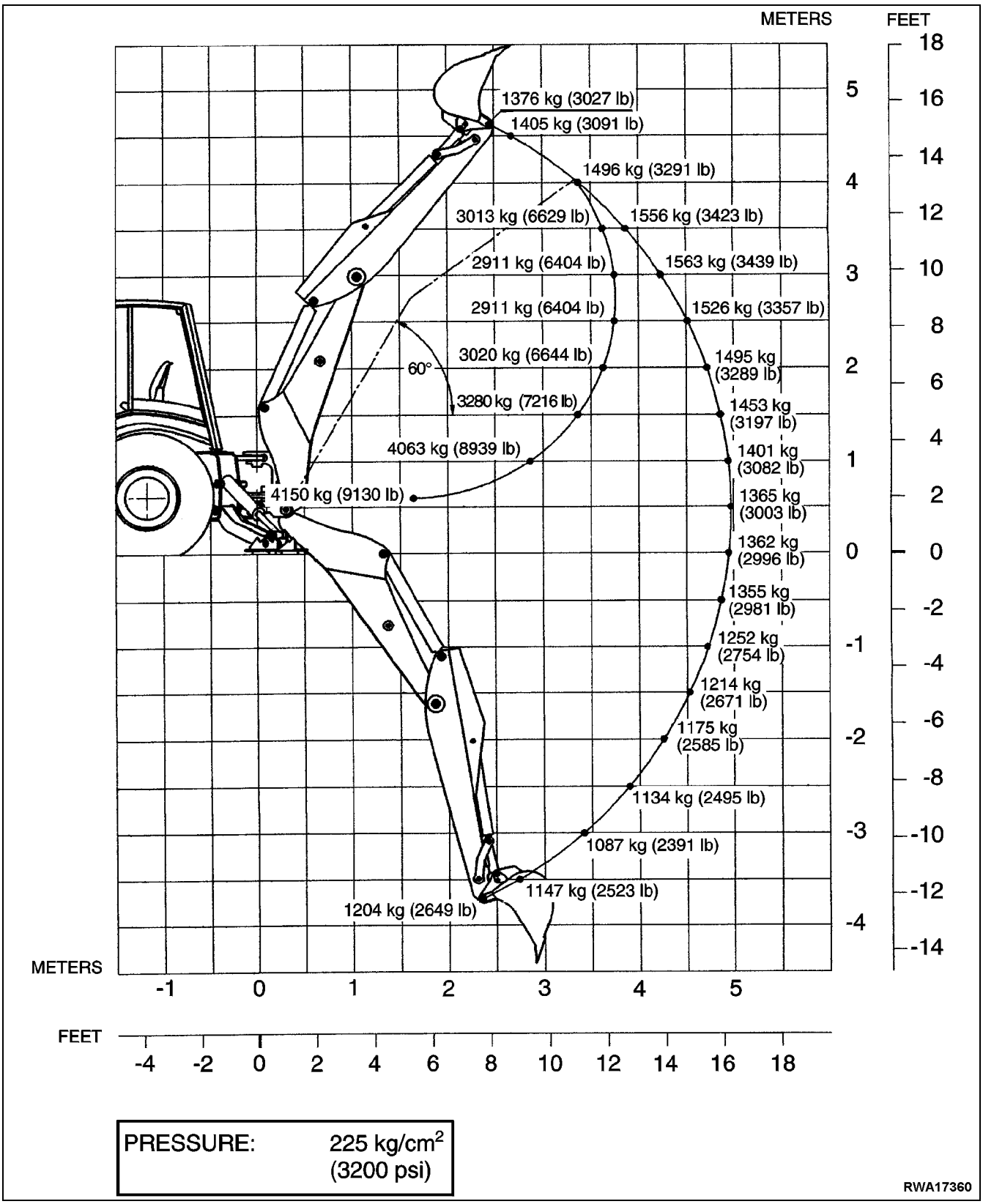


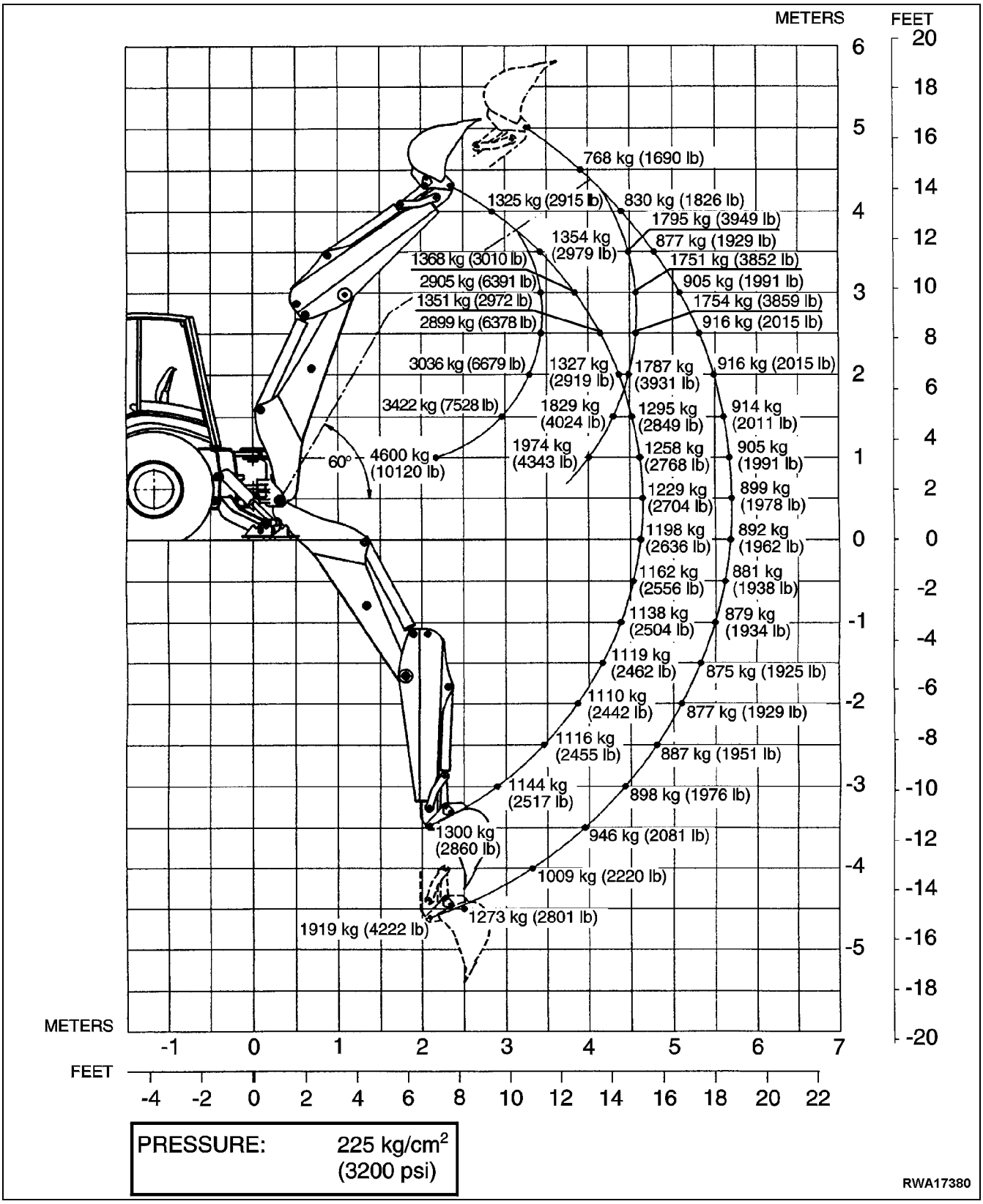
LIFTING CAPACITY WB140-2N




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 WB150-2N




METERS
FEET
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
768 kg (1690 lb)
1325 kg (2915 lb)
830 kg (1826 lb)
1795 kg (3949 lb)
1354 kg (2979 lb)
877 kg (1929 lb)
1368 kg (3010 lb)
1751 kg (3852 lb)
2905 kg (6391 lb)
905 kg (1991 lb)
1351 kg (2972 lb)
1754 kg (3859 lb)
2899 kg (6378 lb)
916 kg (2015 lb)
3036 kg (6679 lb)
1327 kg (2919 lb)
1787 kg (3931 lb)
916 kg (2015 lb)
3422 kg (7528 lb)
1829 kg (4024 lb)
1295 kg (2849 lb)
914 kg (2011 lb)
60°
4600 kg (10120 lb)
1974 kg (4343 lb)
1258 kg (2768 lb)
905 kg (1991 lb)
1229 kg (2704 lb)
899 kg (1978 lb)
1198 kg (2636 lb)
892 kg (1962 lb)
1162 kg (2556 lb)
881 kg (1938 lb)
1138 kg (2504 lb)
879 kg (1934 lb)
1119 kg (2462 lb)
875 kg (1925 lb)
1110 kg (2442 lb)
877 kg (1929 lb)
1116 kg (2455 lb)
887 kg (1951 lb)
1144 kg (2517 lb)
898 kg (1976 lb)
1300 kg (2860 lb)
946 kg (2081 lb)
1009 kg (2220 lb)
1273 kg (2801 lb)
1919 kg (4222 lb)
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: 225 kg/cm2 (3200 psi)
RWA17380

OPTIONAL ATTACHMENTS

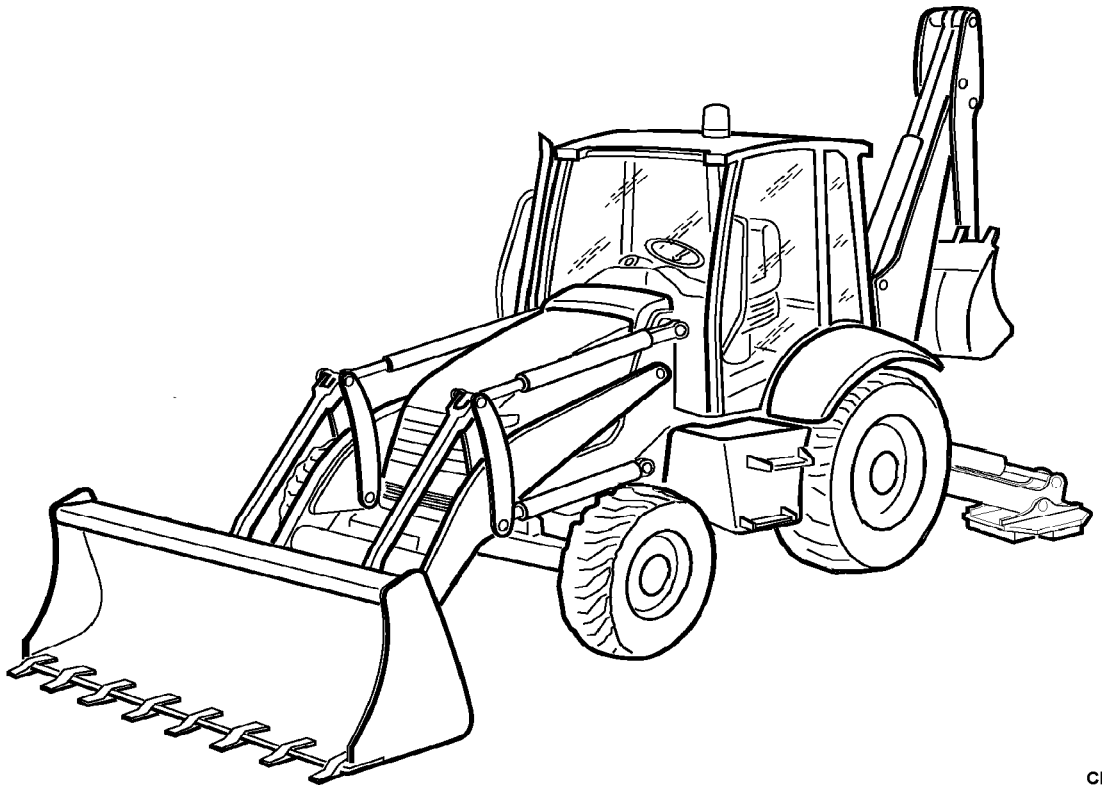
AUTHORIZED OPTIONAL EQUIPMENT

Komatsu machines can be supplied with optional equipment in addition to the standard equipment. If optional equipment is installed and used on your machine, read and study all operations and safety information instructions relating to the optional equipment you will be using. Failure to do so may result in damage to the equipment or injury to the operator. Komatsu cannot be held liable for damage, accident or reduction of machinery performance due to the application and use of unauthorized equipment. Always use 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 optional equipment on a firm level surface.
- Be sure the equipment you are installing is in good operating condition.
- When operations are performed using two or more personnel, agree to a set communication signals in advance and stick to them.
- Always use an overhead crane when lifting equipment weighing more than 25 kg (55 lb.)
- Be aware, the center of gravity on your machine will change when optional equipment is installed.
- Make sure your machine is rated for the optional equipment being installed.
- When using optional equipment be sure all non-authorized personnel are at least 12m (40 ft.) away from your worklocation.



CNC0024

OPTIONAL EQUIPMENT MEASUREMENTS FOR (WB140-2N)

★ Specific weight of the material handling = 1.8 tons/cu.m

FRONT END LOADER

Equipment	Max. Weight kg (lb.)	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)	2320 (91.4)	940 (37)	1.1 (1.44)	—	—
Multipurpose bucket	750 (1654)	2340 (92.1)	1015 (40)	1.00 (1.30)	185 (2682)	75 liters (19.8 gpm)
Lifting forks on bucket	190 (419)	● ●	● ●	❑ ❑	—	—
Pallet forks	320 (706)	1800 (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)	2100 (82.6)	900 (35.4)	0.300 (0.40)	— —	— —
Hydraulic hammer	450 (992)	— —	— —	— —	160 (2320)	80 (21.2)
Drill	360 (794)	800❊ (31.5)❊	2000▲ (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 1140 mm (44.9 inches)
❑ - Maximum capacity 2000 kg (4409 lb.)
❊ - Measurement referenced to the tool diameter
▲ - Measurement referenced to the tool length

OPTIONAL EQUIPMENT MEASUREMENTS FOR (WB150-2N)

★ Specific weight of the material handling = 1.8 tons/cu.m

FRONT END LOADER

Equipment	Max. Weight kg (lb.)	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)	2320 (91.4)	940 (37)	1.1 (1.44)	—	—
Multipurpose bucket	750 (1654)	2340 (92.1)	1015 (40)	1.00 (1.30)	200 (2900)	75 liters (19.8 gpm)
Lifting forks on bucket	190 (419)	● ●	● ●	❑ ❑	—	—
Pallet forks	320 (706)	1800 (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)	2100 (82.6)	900 (35.4)	0.300 (0.40)	— —	— —
Hydraulic hammer	450 (992)	— —	— —	— —	160 (2320)	80 (21.2)
Drill	360 (794)	800❊ (31.5)❊	2000▲ (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)

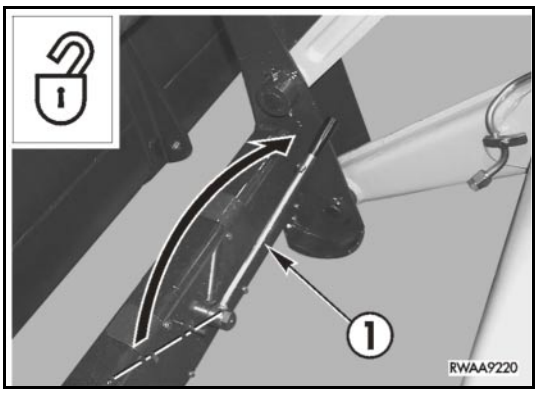
● - Fork length 1140 mm (44.9 inches)
❑ - Maximum capacity 2000 kg (4409 lb.)
❊ - Measurement referenced to the tool diameter
▲ - Measurement referenced to the tool length

FRONT EQUIPMENT QUICK COUPLING DEVICES

All coupling and uncoupling operations must be performed on flat firm-surface. Before beginning work operations be sure the equipment installed is in good working order and installed correctly.

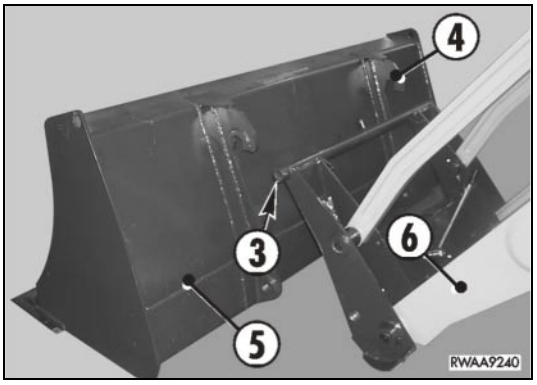
MANUAL CONTROL QUICK COUPLING

Rotate the lock lever handle (1) to unlock the fulcrum pin.

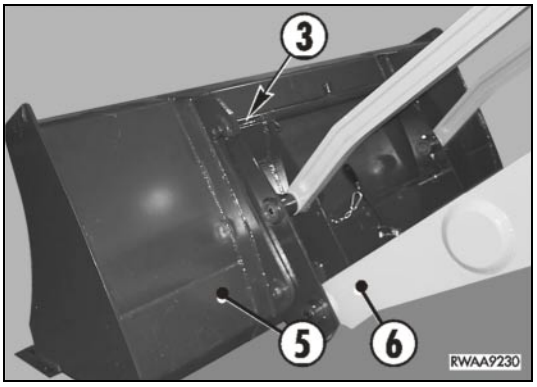


Position the machine so the support cradle is perpendicular to the equipment being installed.

Operate the bucket control lever so the fixed coupling pins (3) are positioned under the upper seating surface (4) on the bucket (5)

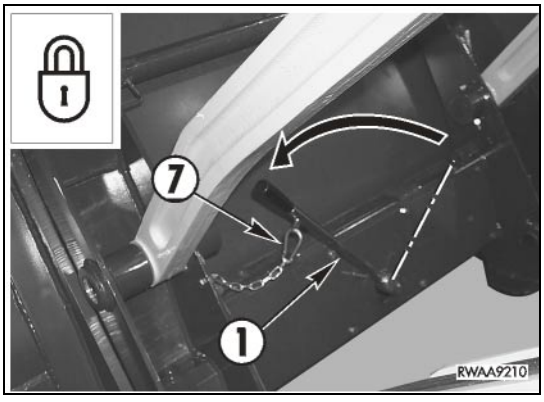


Raise the arm (6) to engage the pins (3) in the upper seats (4) on the bucket (5). When in place, raise the bucket slightly.



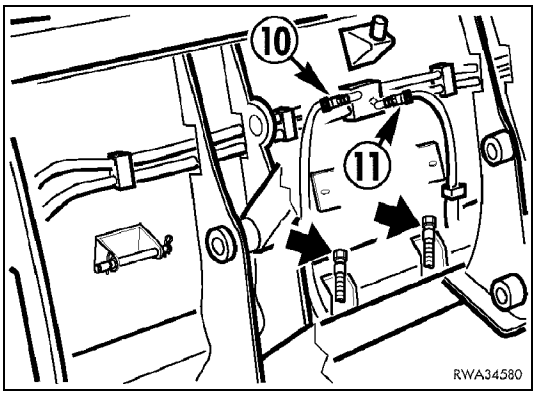
Rotate the lock lever handle (1) to lock the fulcrum pin and hook up the safety restraint (7).

Lube all fittings after installation.



MULTIPURPOSE BUCKET

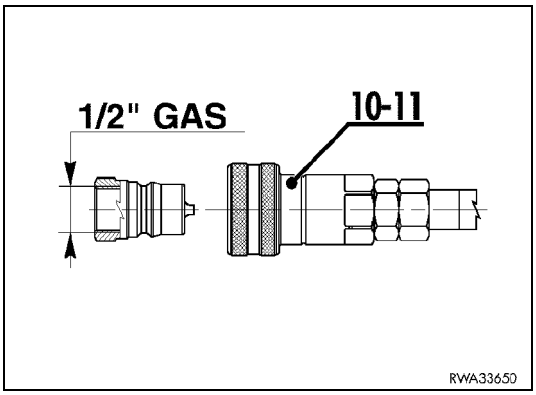
The operations to be performed when installing the multipurpose bucket are the same described in the previous paragraph with changes regarding the backward movement and engagement of the pins



When installing the quick couplings, be sure the engine is off and all pressure to the quick couplings is released. Operate the controls to relieve all pressure in the system. When installing hook up coupling (10) and (11)

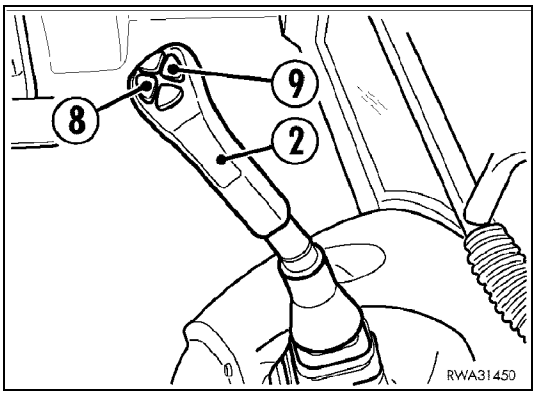
⚠ WARNING

Always ware a face shield and gloves to protect your face and hands from hydraulic oil or metal chips.

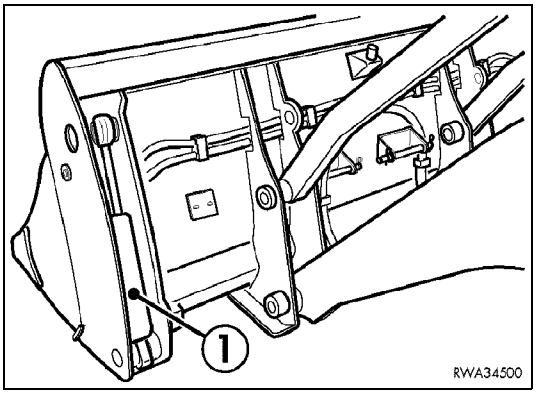


Once the couplings are installed, start the engine and operate the control lever (2), open and close buttons (8) and (9). Turn the engine off and check for any leaks.

See “FRONT END LOADER CONTROLS” on page 2-16.

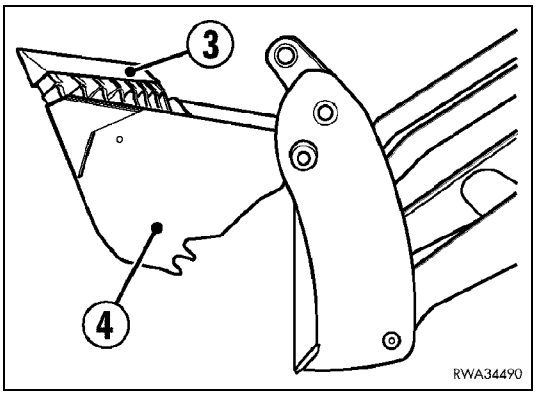


The bucket is opened and closed using two hydraulic cylinders (1)



BUCKET OPERATION

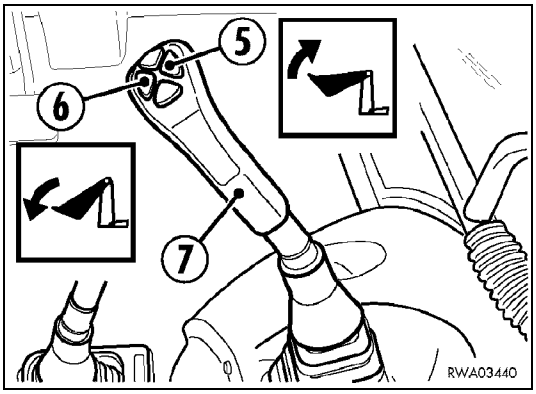
The multipurpose bucket can be used for several applications. It eliminates the need for specific equipment. The multipurpose bucket offers the option of a load and scoop bucket as well as a dozer blade for grading and trench filling purposes. A set of optional lifting forks can be installed for material handling purposes.



DESCRIPTION

The bucket jaws (4) can be opened to unload materials or used as a dozer blade for filling trenches.
The multipurpose bucket is equipped with a teeth protection casing (3)

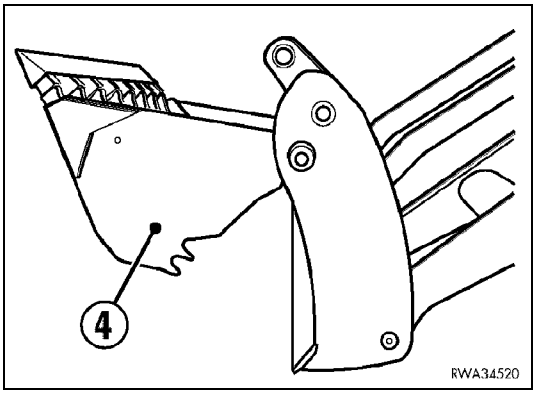
By pressing buttons (5) and (6) the bucket jaws can be controlled



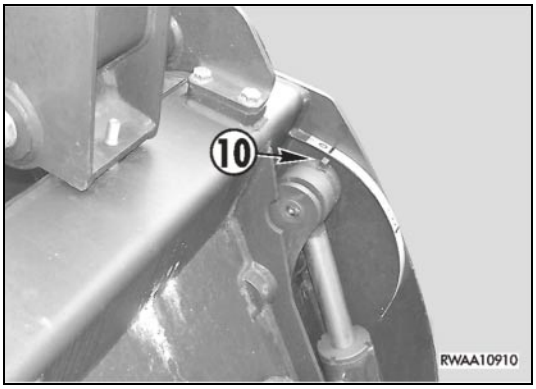
BUCKET USES

The multipurpose bucket can be used for the following applications:

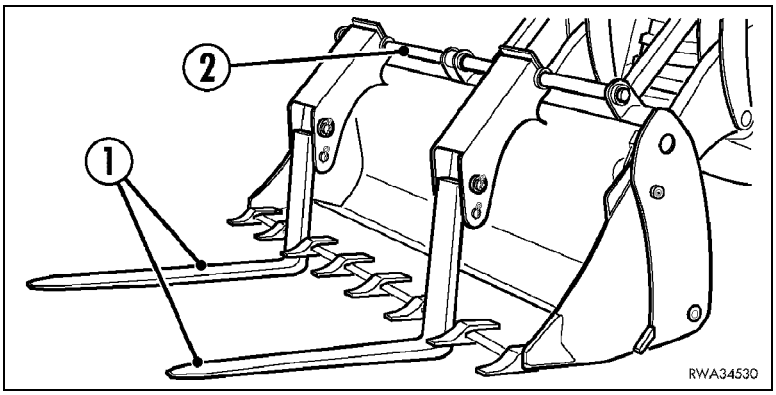
- Loading heaped material as described in “LOADING HEAPED MATERIAL” on page 2-36.
- Unloading on high surfaces by opening the bucket instead of rolling it forward.
- Grasping logs or objects.
- Filling trenches and grading.



The bucket is also equipped with an indicator (10) to show the position of the upper part of the bucket.



PALLET FORKS KIT



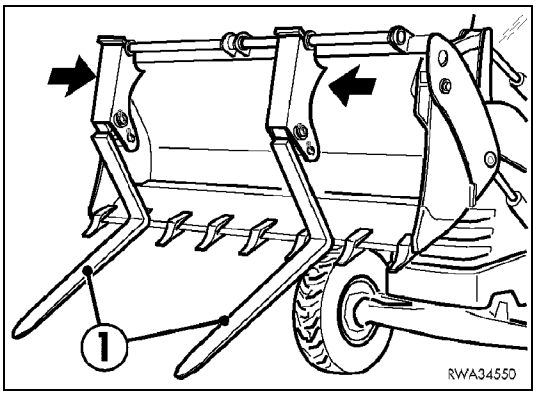
The optional pallet forks are usually installed on the multipurpose bucket for handling pallets of materials, loading and unloading various pipe.The distance between the forks (1) can be adjusted by sliding them on the bar (2).

To adjust the forks (1):

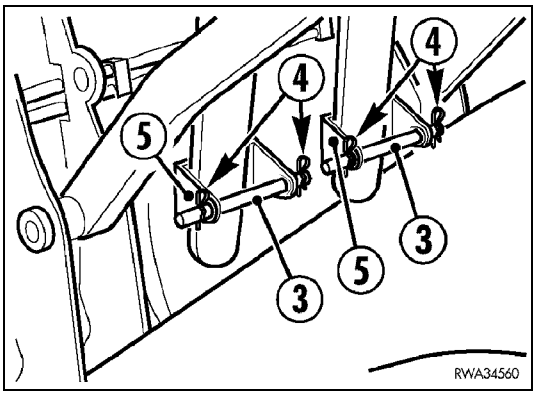
- Raise the bucket high enough to clear the-ground.
- Tip the bucket forward far enough to clear the bucket teeth.
- Re-position the forks to the desired distance
- Tip the bucket back being sure the forks do not rest on the tips of the bucket teeth.

Remark

When using the forks be sure the forks are fully engaged into the load. Never carry a load on the tips of the forks. Always be aware of the extra length your forks will add when maneu-vering the machine.



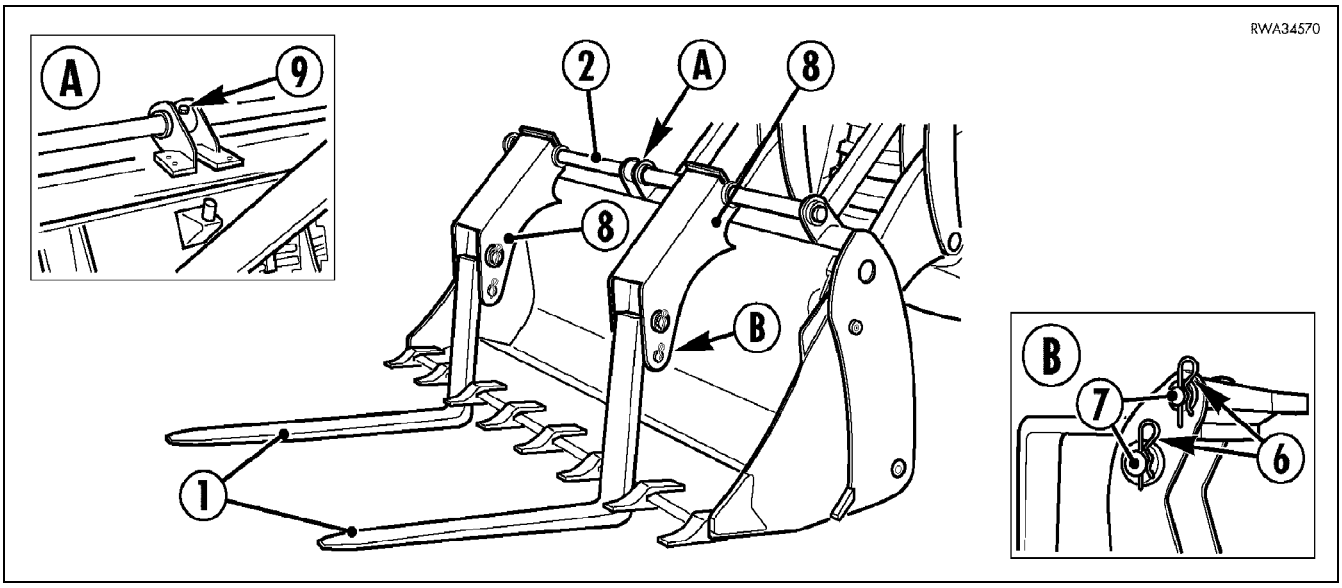
When traveling with the machine or when not using the forks be sure they are locked in the holding place (5) with the pins (3) and the pins are secured with the four lock pins (4).



REMOVING AND INSTALLING THE FORKS

To remove or install the pallet forks kit, proceed as follows:

- Rest the bucket in a horizontal position on a flat and level surface.
- Remove safety pins (6) and (7).
- Supports (B) must also be removed.
- Remove the fasteners (9) that hold the bar (2) in place.
- Hold one of the supports (8) and withdraw the slide bar (2), repeat the same operation for the support.



To install the forks, repeat the following procedure in reverse order.

⚠ WARNING

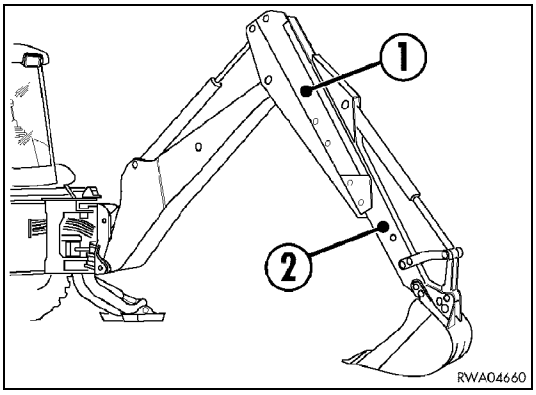
Always ware gloves and face shield when wen removing or installing the forks or any other optional equipment.

BACKHOE TELESCOPIC ARM

The option of extending the backhoe arm makes it possible to perform operations outside of the normal backhoe radius. This would be for grading, ditch cleaning and using optional attachments.

DESCRIPTION AND CONTROL

This structure is designed with an external hollow arm (1) within the inner arm (2) supporting the equipment slides on a "V" shaped series of guides. This arm is extended or retracted hydraulically.

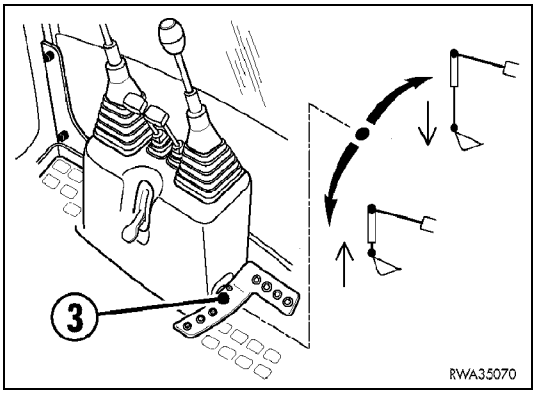


The system controlling the telescopic arm movement is controlled by a pedal (3) positioned in the operators compartment. When the pedal is rocked forward, the arm is extended, when the pedal is rocked backward the arm is retracted.

Remark

When the arm is extended, the breakout force of the backhoe is reduced when lifting loads.

"OPERATING THE BACKHOE" on page 2-38.

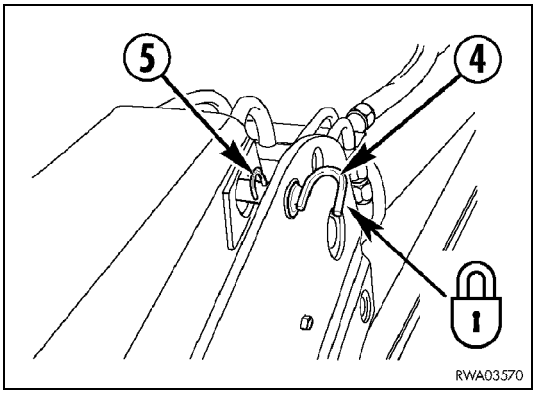


SAFETY LOCKS

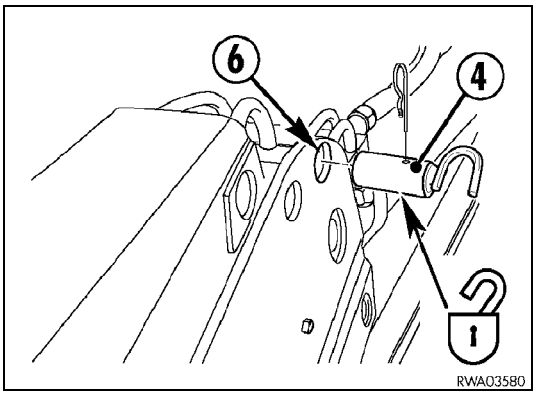
When traveling or operating the front end loader, the safety clip (4)must be inserted into the telescopic arm and pined in place with the pin(5).

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

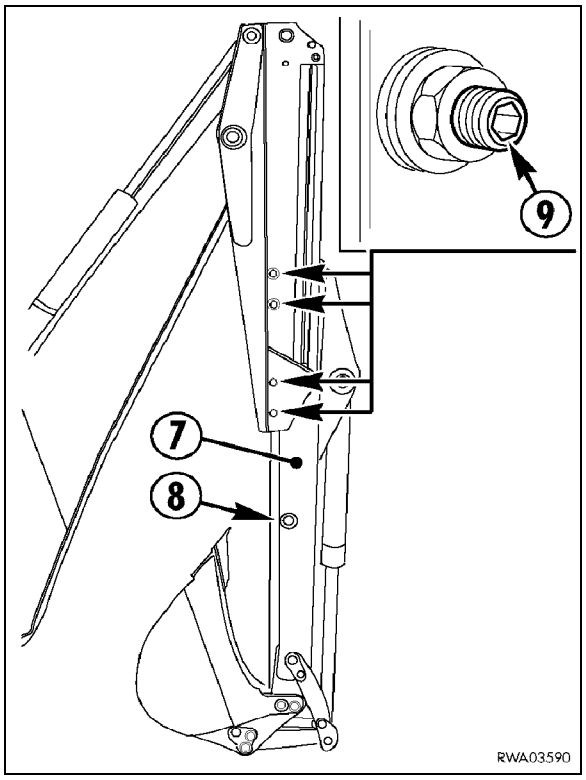
The telescopic arm requires two maintenance procedures:

- Lubrication of joints (grease fittings). S“LUBRICATION DIAGRAMS” on page 3-12.
- Adjustment of slide guide (8) slack done occasionally, when in pace or vibrations are noticed during work

.

WARNING

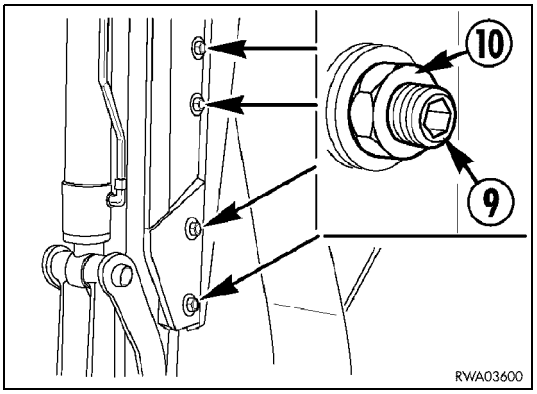
When leaving the operators compartment to adjust the guides, remove the ignition key and tag the steering wheel. Adjust the screws and guides one by one. Do not place tools in the space between the safety locks and arm.



1. Position the machine on a flat firm surface and lower both-outriggers.
2. Raise the boom, completely fold the bucket and completely extend the telescopic arm (7).
3. Fold the arm until 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. Check the side which has the guide adjusting dowels (9) protruding the most. Only make adjustments on this side.

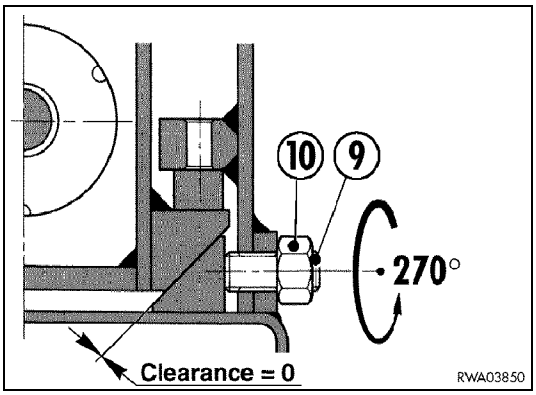
Remark

If adjusting dowels (9) protrude the same amount on both sides, the step 6 adjustment can be done on either the right or left side.

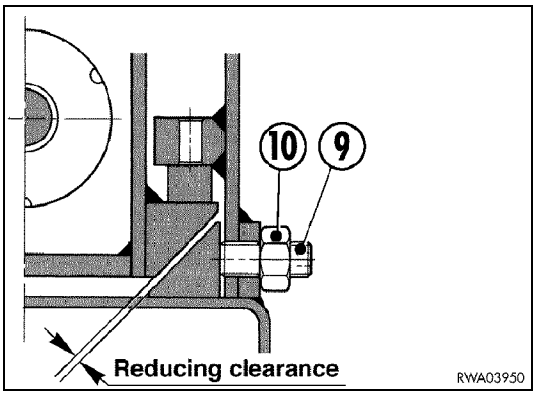


6. Loosen the four lock nuts (10) and thoroughly tighten adjusting dowels (9), until slack is completely eliminated.

7. Starting from the central position, loosen the adjusting dowels (9)270° (3 to 4 turns) and lock them with lock nuts (10).

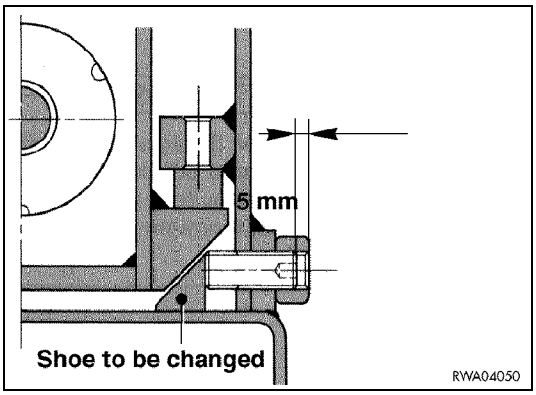


8. Start the machine, extend and retract the telescopic arm several times to make sure it slides correctly.



9. Lubricate all lubrication points on the telescopic arm.

10. Extend and retract the arm one more time to spread the lubricant on to the slides.



Remark

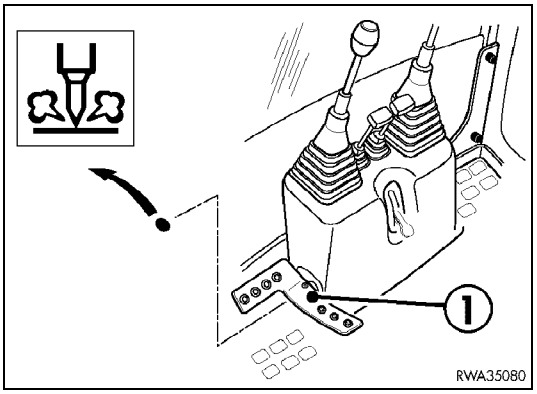
The wear limit allowed for the shoes is represented by the minimum engagement of the adjusting dowels (9) in the lock nuts. The shoes must be replaced when the heads of the dowels (9) are recessed 5mm (0.2 in) inside lock nuts (10). Do not completely remove all slack, to prevent the guides from seizing.

DEMOLITION HAMMER

The machine can be fitted for the application of a demolition hammer on the backhoe unit. This hammer is used for breaking up concrete, asphalt or rocks. The geometry of the tool must be defined according to the nature of the materials to be broken and the type of work to be carried out.

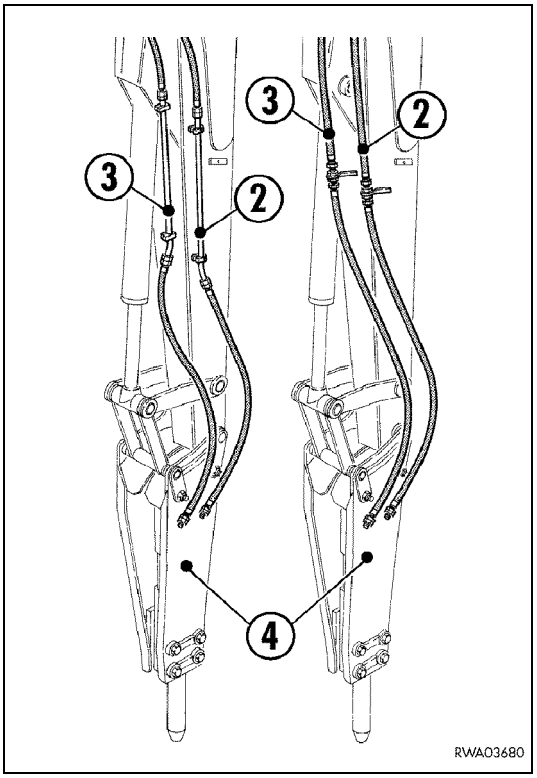
DESCRIPTION AND CONTROL

The operation of the hammer is obtained by means of an additional pedal (1) positioned on the left side of the backhoe control levers.



The hammer is operated by pressing the pedal (1) When the pedal is rocked forward, the hammer is activated, when the pedal is rocked backward or releasing it, the hammer is de-activated.

The arrangement includes the fixed connection of the hydraulic delivery line (2) and return line (3) with the hammer (4)



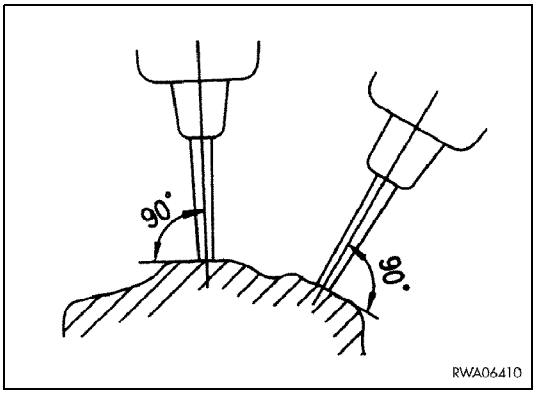
RULES FOR HAMMER USAGE

⚠ WARNING

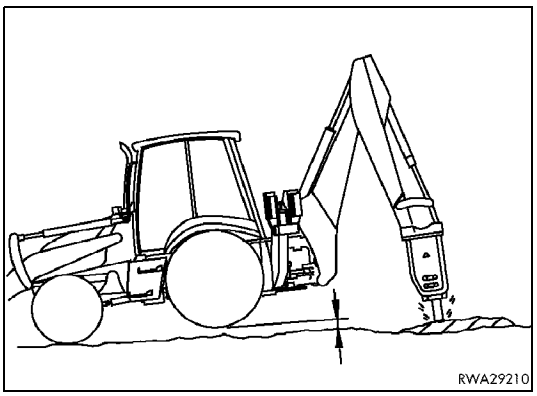
When using the hammer attachment, always wear eye and hearing protection. Never allow anyone to stand near you while using the hammer.

For correct usage, it is necessary to:

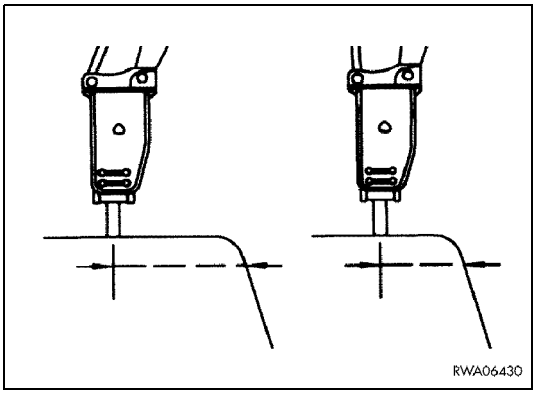
1. Make sure the position of the hammer is correct with respect to the material to be broken. Be sure it is as perpendicular as possible and the arm thrust is sufficient, so that the power of the hammer can be exploited.



2. Keep constant downward pressure on the hammer tool as it penetrates into the material to be broken. This means raising the wheels approximately 5cm (2 in) off the ground. Be careful not to swing or move the machine when performing this operation.



3. When working on very hard materials, it is important not to keep hitting the same point for more than 30 seconds. Hit the same point for a few seconds and then change position very frequently, in order to facilitate the breaking process.



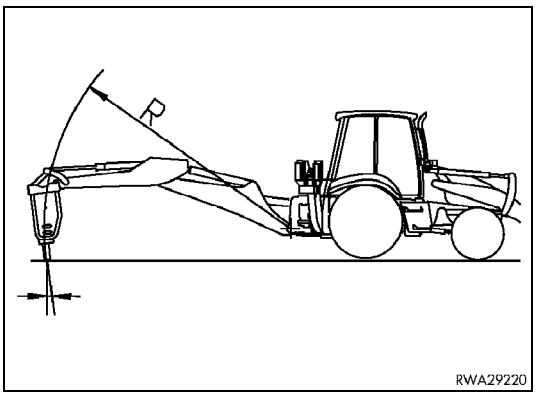
Remark

Remember the power in the backhoe unit is the breakout feature when using this tool. Do not use the backhoe unit to reposition or swing the machine to the left or right. Doing so will damage the swing cylinders or possibly tip the machine over.

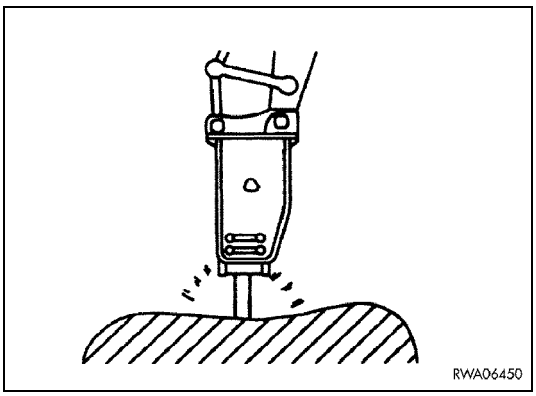
4. To facilitate the sliding of the tool on its seat, check the thrust direction and always correct the hitting position of the hammer by using the bucket and arm control.

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)

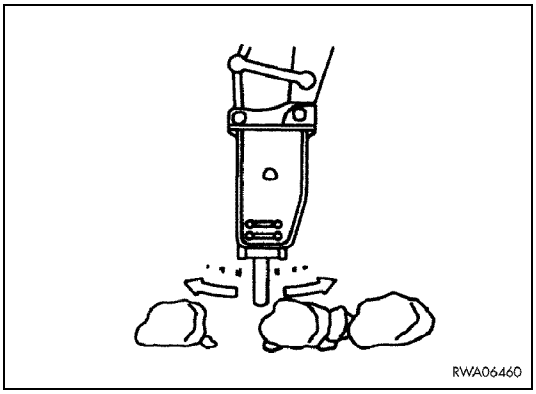


5. Always be sure the arm at its optimal position to avoid harmful or useless strokes.



ALWAYS AVOID THE FOLLOWING USES:

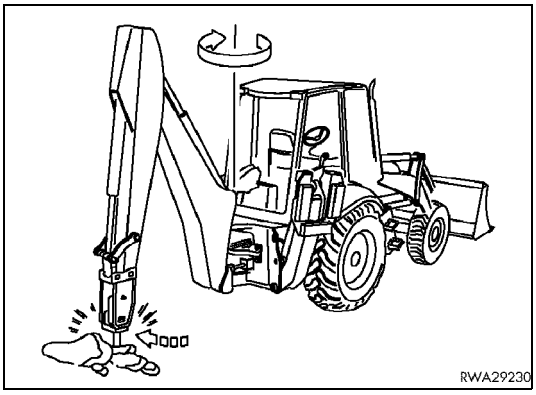
Gathering or moving materials with the demolition hammer.



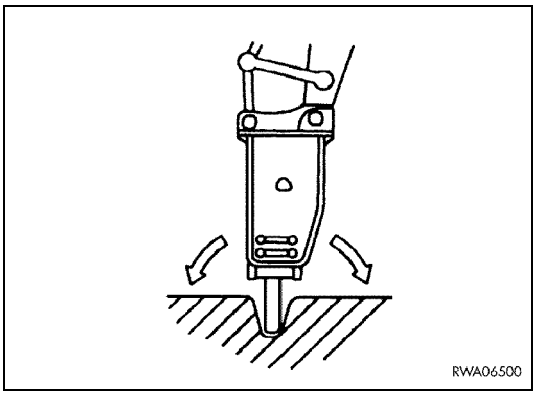
Rotating the boom while using the hammer

Remark

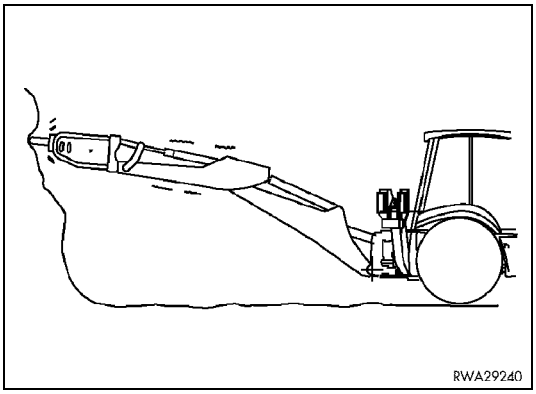
Remember the power in the backhoe unit is the breakout feature when using this tool. Do not use the backhoe unit to reposition or swing the machine to the left or right. Doing so will damage the swing cylinders or possibly tip the machine over.



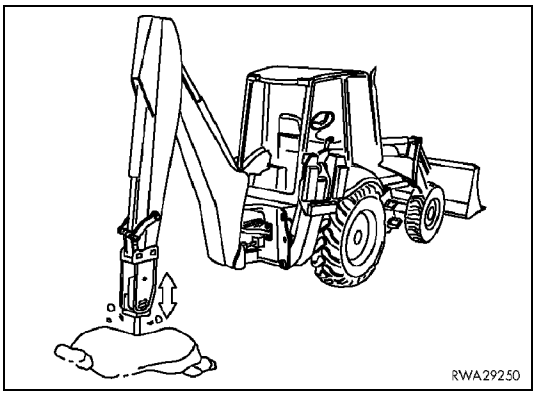
Moving the tool back and forth while breaking the material or using the tool as a pry bar between the broken material.



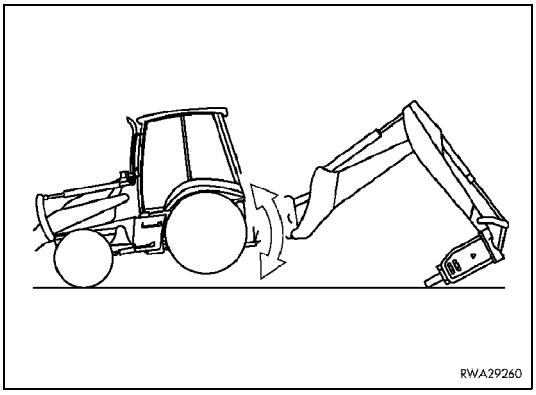
Working with the hammer in a horizontal position or even with the greater inclination of the machine.



Striking the ground with the hammer bit.



Lifting the machine with the demolition hammer



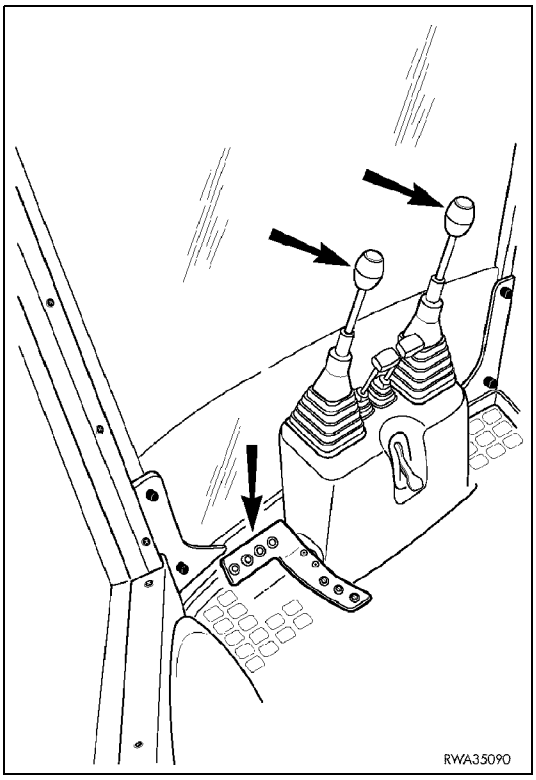
INSTALLATION AND REMOVAL OF THE DEMOLITION HAMMER

⚠ WARNING

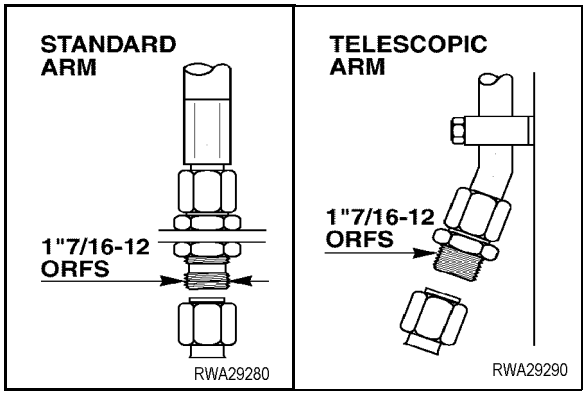
.When removing or installing the hammer, always wear eye and hand protection. Before carrying our removal or installation relieve all hydraulic pressure first

INSTALLATION

For the installation of the demolition hammer it is necessary to connect the mechanical constraints of the backhoe bucket as described in: “CHANGING THE BACKHOE BUCKET” on page 2-41. To carry out hydraulic connections, proceed as follows:



1. Stop the engine and neutralize all the hydraulic controls to relieve all pressure in the system.
2. Press the hammer control pedal to release the pressure in the hydraulic piping for the hammer.
3. Remove the cap plugs from the hydraulic piping and hoses.(use a 32, 36, 38 and a 41mm wrench)
4. Connect the right coupling and then the left coupling.Make sure the connections all match
5. Be careful not to get impurities between the couplings when installing them.
6. Once connected and tight, start the engine and raise the hammer positioning it vertically.
7. Stop the engine and lubricate all points on the hammer.
8. Before starting work operations, check for any leaks.



REMOVAL

To remove the hammer, proceed as follows:

1. Stop the engine and neutralize all the hydraulic controls to relieve all pressure on the system.
2. Press the hammer control pedal to release the pressure present in the hammer hydraulic system.
3. Disconnect the hammer delivery and return lines capping them immediately.
4. Disconnect hammer from the constraints described in: “CHANGING THE BACKHOE BUCKET” on page 2-41.
5. Operate the controls and check for any leaks around the caps.

CLAMSHELL BUCKET

The machine can be arranged for the installation of a clamshell type bucket on the backhoe instead of the standard digging-bucket. The installation of the clamshell bucket allows the option of picking up material from a single point rather than scooping it with the digging bucket.

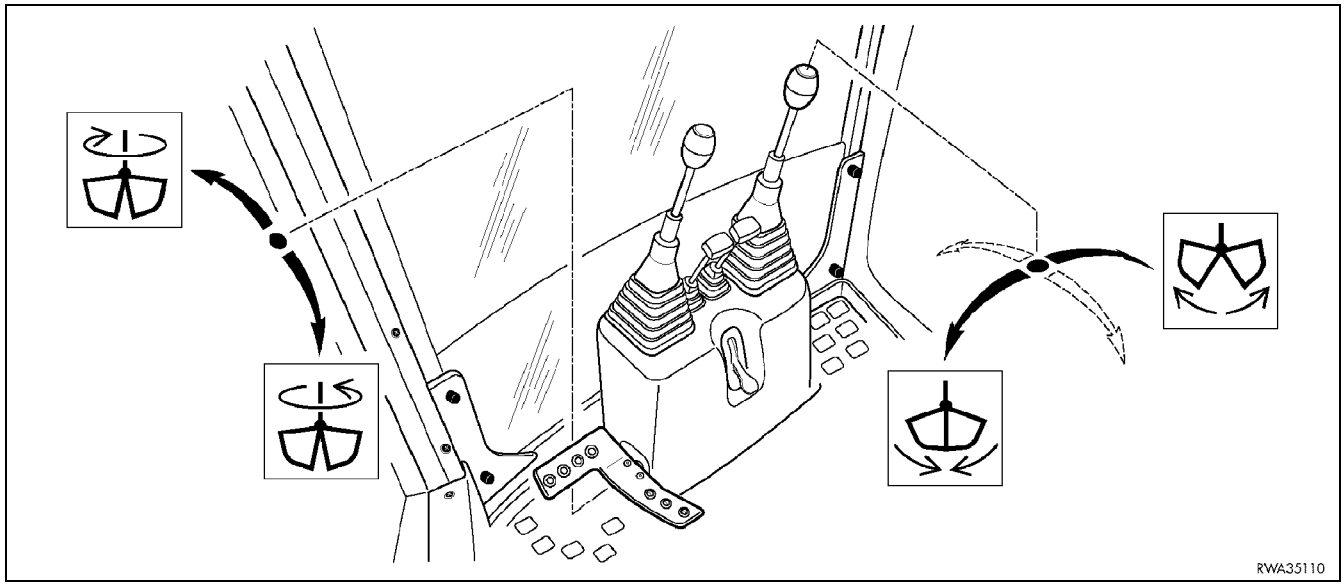
⚠ WARNING

If the machine will be equipped with a clamshell bucket, it is advised not to travel on roads due to size and fact the clamshell is suspended from the arm and will swing when traveling. All work with the clamshell bucket must start and end at the work site.

DESCRIPTION AND CONTROL

For the swing movement of the clamshell bucket an independent hydraulic circuit controlled by an additional distributor is provided, while the opening and closing operation is controlled by the standard backhoe digging bucket circuit. The other movements for the boom and arm remain unchanged.See “OPERATING THE BACKHOE” on page 2-38.

- The clockwise rotation of the bucket is obtained by pressing the foot pedal rolling it forward.
- The counter clockwise rotation of the bucket is obtained by pressing the foot pedal rolling it backward.
- To open the clamshell, move the right wobble stick to the right, and to close the clamshell, move the right wobble stick to the left.

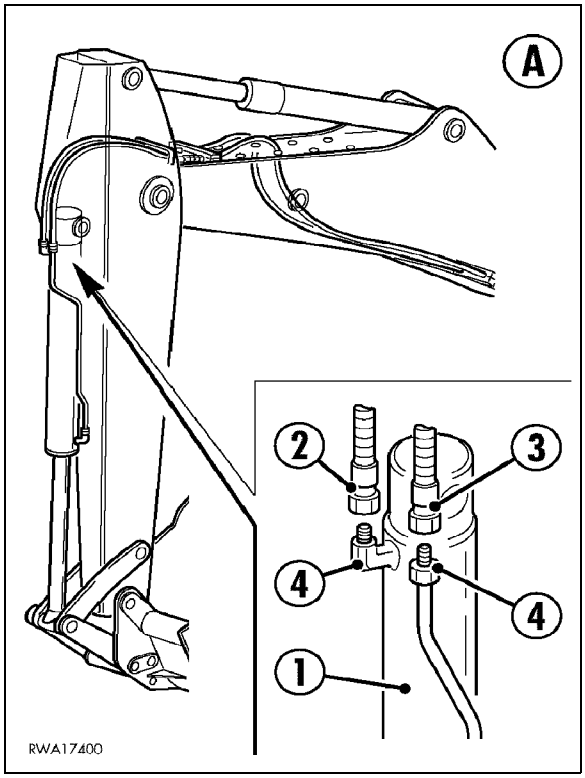


INSTALLATION AND REMOVAL OF THE CLAMSHELL BUCKET

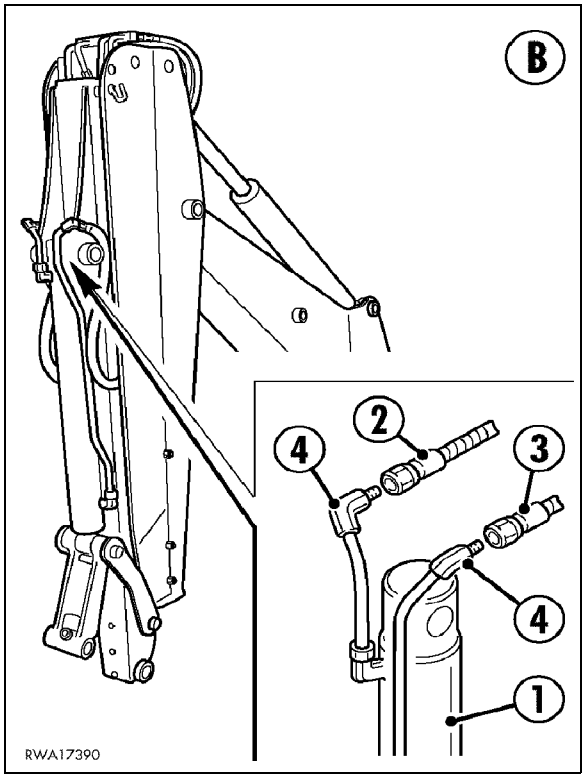
INSTALLATION

To install the clamshell bucket the aid of another person will berequired. To perform installation procedures, proceed as follows:

1. All work must be carried out on a flat smooth surface.
2. Neutralize all hydraulic controls and remove the standard digging bucket. See “CHANGING THE BACKHOE BUCKET” on page 2-41.
3. Retract the digging bucket cylinder ram completely.
4. Install the clamshell bucket to the arm.
5. Stop the machine and neutralize all the hydraulic controls.
6. Lock the bucket ram in place at the end of its stroke.
7. In figure (A) disconnect the supply lines (2) and (3) that operate the bucket cylinder (1). Seal the couplings (4).



8. In figure (B) disconnect the supply lines (2) and (3) that operate the bucket cylinder (1). Seal the couplings (4).
9. Connect the supply lines from the standard bucket cylinder to the lines controlling the clamshell bucket.
10. Be sure all unused lines are capped and sealed. be careful when installing lines. be sure dirt or debris does not get trapped in these couplings.
11. Start the machine and raise the clamshell off the ground.
12. Open close and swing the bucket several times.



REMOVAL

To remove the clamshell bucket follow in the reverse order.

⚠ WARNING

When removing or installing the clamshell bucket, always wear eye and hand protection.

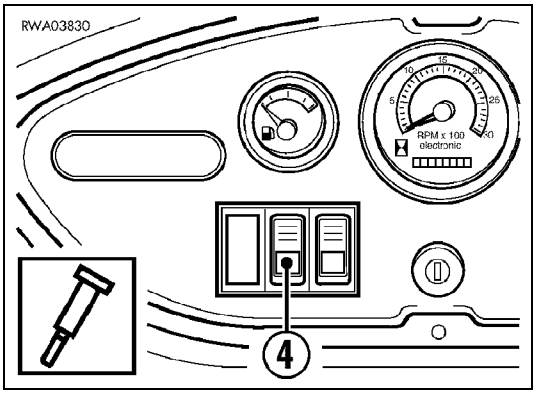
OPERATING THE CLAMSHELL BUCKET

Consult the specific operators manual for the clamshell bucket.

HYDRAULIC JACK HAMMER

Due to the fact that 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

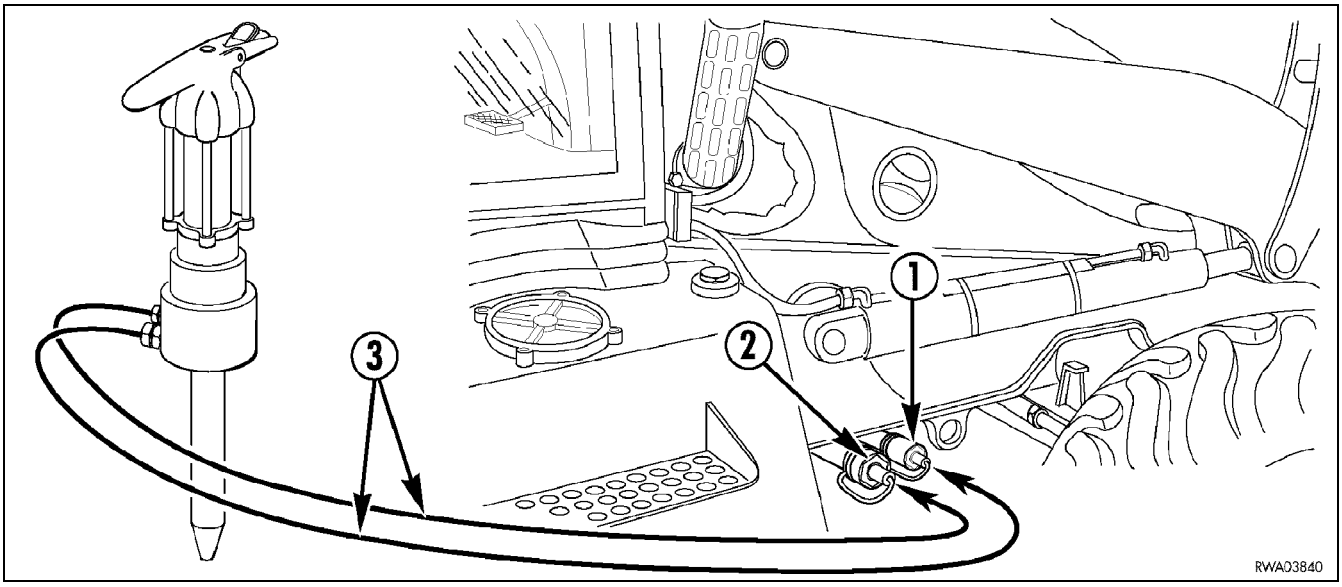


The machine can be provided with the delivery (1) and return (2) couplings for the use of a manual hydraulic jack hammer, the connection to the machine is made up of two flexible lines (3).

The circuit is separated from the normal circuits by a solenoid valve and activated by a switch (4) positioned on the dash board.

By pressing the switch once energizes the solenoid and allows the system to operate. If the switch is pressed a second time, the system is disengaged.
When the system is in operation the switch will be illuminated.

For operation of the jack hammer, see the manual provided with the tool.



CONNECTING AND REMOVING THE JACK HAMMER

WARNING

Connection and removal of the hammer must be carried out with machine in the parked position, parking brake set, and all safety locks engaged.

CONNECTING THE JACK HAMMER

To connect the hammer, proceed as follows:

1. Stop engine and neutralize all hydraulic controls to relieve any pressure on the system.
2. Turn ignition switch to the “I” position and press switch (4) to release any residual pressure from the hammer.
3. Make sure couplings are clean and free from dirt or debris. Carefully install the couplings.
4. Turn switch (4) off and start the engine.
5. Engage switch (4) and increase engine RPM to required setting in the tool operation manual.

DISCONNECTING THE JACK HAMMER

To disconnect the hammer, proceed as follows:

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 and press switch (4) to release any residual pressure from the hammer.
4. Turn switch off.
5. Disconnect the tool and cap all connection openings.

USING THE JACK HAMMER

For operation of jack hammer, see manual provided with the tool.

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