CEAM013800

Operation and Maintenance Manual

GALEO

WA320PT-5L

PARALLEL TOOL CARRIER

SERIAL NUMBERS **WA320PT-5L** **A39001** and UP

April 2005

Published in USA
Komatsu America Corp.

EMISSION CONTROL WARRANTY

EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)

1. Products Warranted

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

2. Coverage

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

3. Limitations

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

KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This warranty, together with the express commercial warranties, are the sole warranties of Komatsu. **THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS

ÉNONCÉ DE GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS (APPLICABLE AU CANADA SEULEMENT):

1. Produits garantis:

Komatsu America International Company, Komatsu Mining Systems Inc. et Komatsu Utility Corporation (collectivement Komatsu) produisent et/ou font la mise en marché de produits portant les noms de marque Komatsu, Dresser, Dressta, Haulpak et Galion. Cette garantie sur les émissions s'applique à tous les nouveaux moteurs portant le nom Komatsu, installés dans ces produits et utilisés au Canada dans des machines conçues pour utilisation industrielle non-routière. Cette garantie s'applique seulement sur les moteurs produits à partir du 1er Janvier 2000. Cette garantie sera administrée par la distribution de Komatsu au Canada.

2. Couverture:

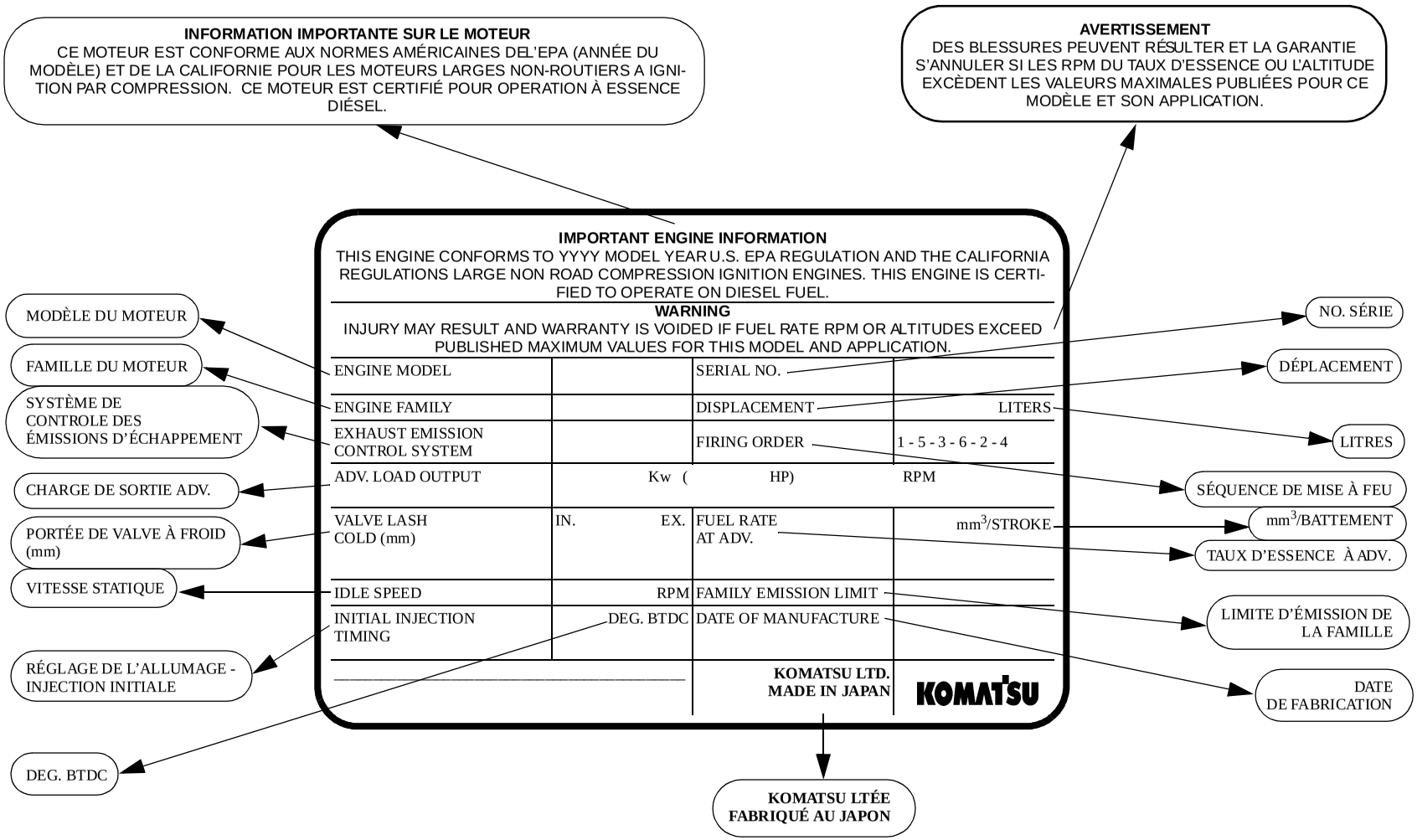
Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de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

3. Limitations:

Les bris, autres que ceux résultant de défauts de matériaux ou de construction, ne sont pas couverts par cette Garantie. Komatsu n'est pas responsable pour bris ou dommages résultant de ce que Komatsu détermine comme étant de l'abus ou négligence, incluant mais ne se limitant pas à: l'opération sans lubrifiants ou agent refroidissants adéquats; la suralimentation d'essence; la survitesse; le manque d'entretien des systèmes de lubrification, de refroidissement ou d'entrée; de pratiques non-propices d'entreposage, de mise en marche, de réchauffement, de conditionnement ou d'arrêt; les modifications non-autorisées du moteur. De plus, Komatsu n'est pas responsable de bris causés par de l'essence inadéquate ou de l'eau, des saletés ou autres contaminants dans l'essence. Komatsu n'est pas responsable des réparations non-reliées au moteur, des dépenses encourues suite aux temps d'arrêts, des dommages relatifs, amendes, et de tout autre coût d'affaires ou autres pertes résultant d'un bris couvert par la garantie.

KOMATSU N'EST PAS RESPONSABLE DES INCIDENTS OU DOMMAGES CONSÉQUENTS.

Cette garantie, ainsi que les garanties expresses commerciales, sont les seules garanties de Komatsu. **IL N'Y A AUCUNE AUTRE GARANTIE, EXPRESSE OU SOUS-ENTENDUE, MARCHANDABLE OU PROPICE A UNE UTILISATION PARTICULIÈRE.**



ENGINE DATAPLATE - ENGLISH / FRENCH

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	BEPB041100
OPERATION AND MAINTENANCE MANUAL	
Chassis and Engine	CEAM013800
SHOP MANUAL	
Chassis	CEBM013600
Engine	SEBM010020
SAFETY MANUAL	
Machine specific	WLT70-1

Parts and Service Publications can *only* be acquired by authorized KOMATSU distributors using the Komatsu America Corp. Extranet Literature Ordering System.

If the Extranet Literature Ordering 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. Komatsu America Corp. reserves the right to add a surcharge to all fax orders.

REQUISITION FOR TECHNICAL SERVICE PUBLICATIONS AND SERVICE FORMS

COMPLETE FORM AND RETURN TO →

DataKom Publications and Training Division
440 North Fairway Drive
Vernon Hills, IL 60061-8112 U.S.A.
Attn: Service Publications
Fax No. (847) 970-4186
Tel No. (847) 970-5887

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ATTN.
STREET ADDRESS
CITY, STATE, ZIP CODE
COUNTRY

PURCHASE ORDER NO.

ORDER DATE

PHONE NO.	FAX NO.	SHIPPING METHOD	DISTR/BRANCH CODE

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 can not 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.

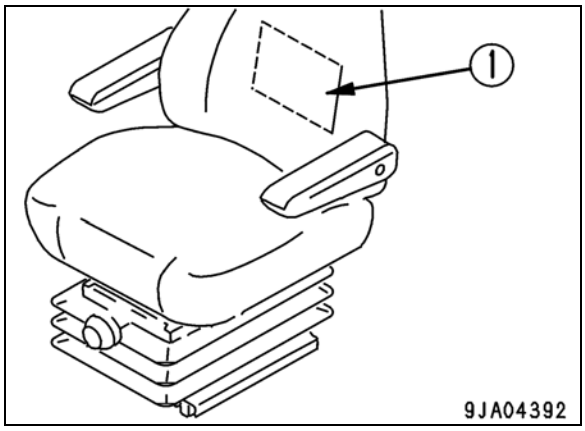
This manual may contain attachments and optional equipment that are not available in your area. Consult your local KOMATSU Distributor or for those items that you may require.

⚠ 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 ★**

❇ Storage location for Operation and Maintenance Manual is in the pocket (1) at rear of operators seat back rest.



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 **(1-1)**

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 WHEEL LOADER described in this manual has 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 operations.
- Excavating.
- Grading.
- Pushing

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

- Handling of materials (bucket - pallet forks).
- Lifting of materials (extendable boom).

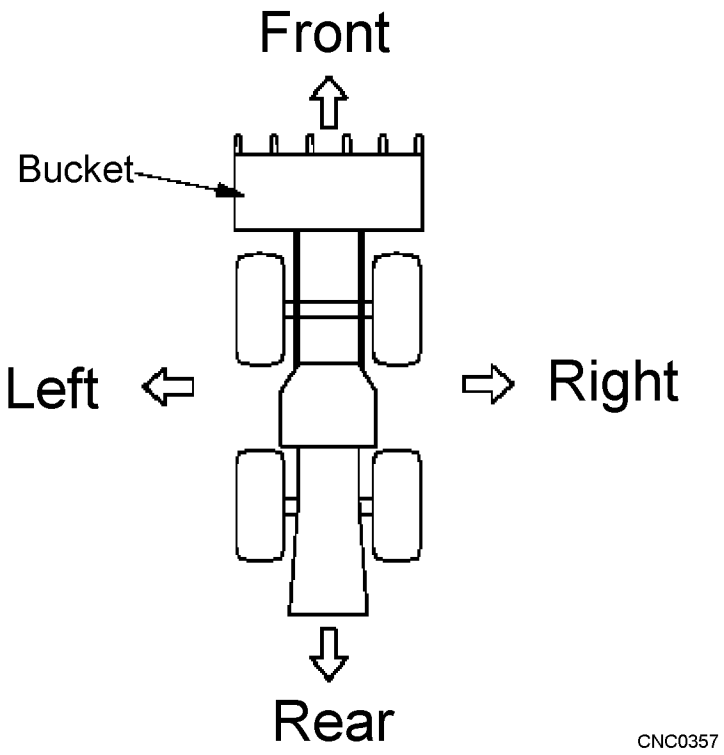
NON-APPROVED

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 manner.
- Transportation of flammable liquids.
- Lifting, moving or transporting other machines with the front end equipment.
- Towing other equipment with the tractor unit or work equipment.
- Using the loader as a hammer or for striking or driving objects.
- Towing the machine at high speeds
- Traveling at high speeds.

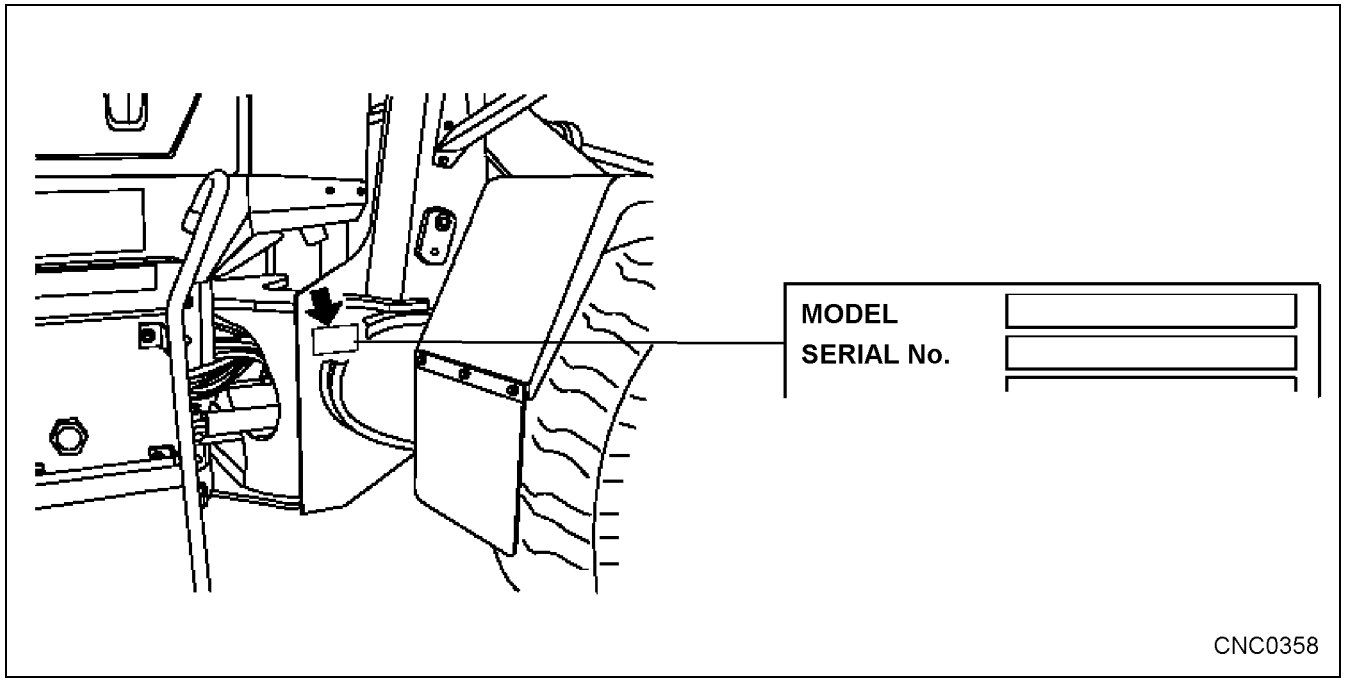
PRODUCT IDENTIFICATION

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 0-7 (Serial Number And Dealer Information). All views indicated below are viewed from the operators sitting position.



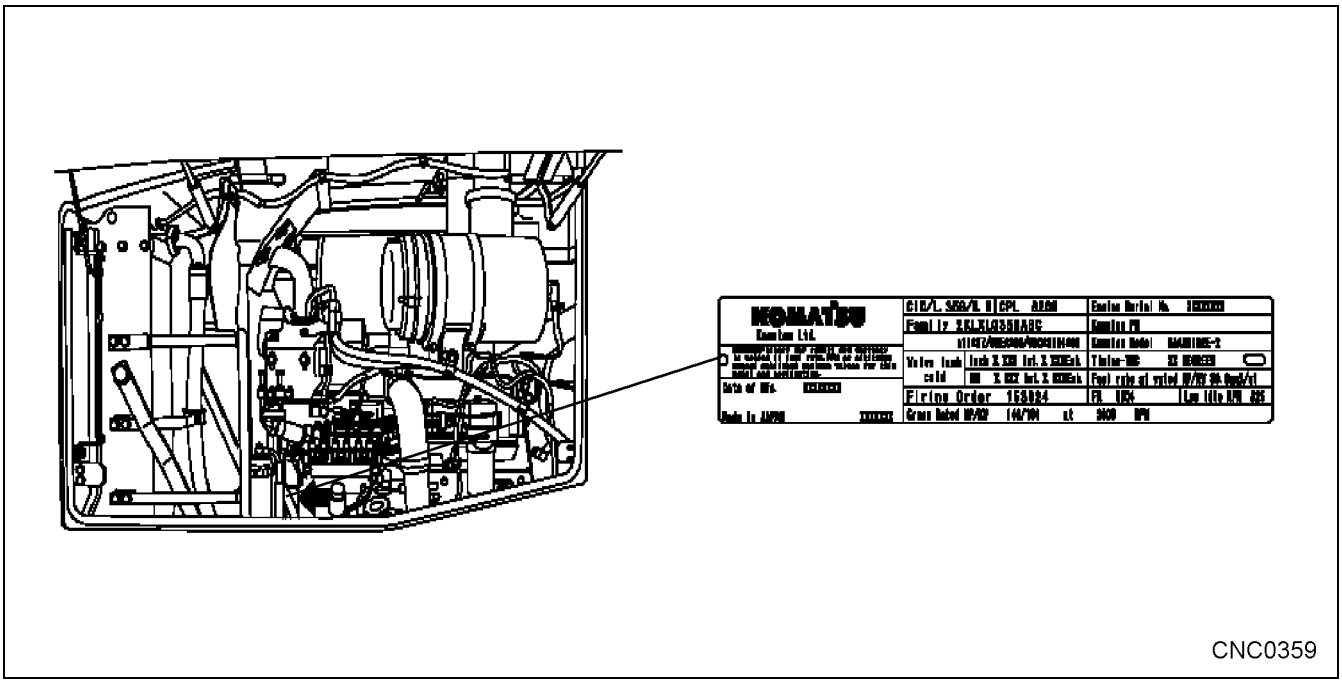
MACHINE SERIAL NUMBER

The machine serial number is stamped on the right side center of the front frame.



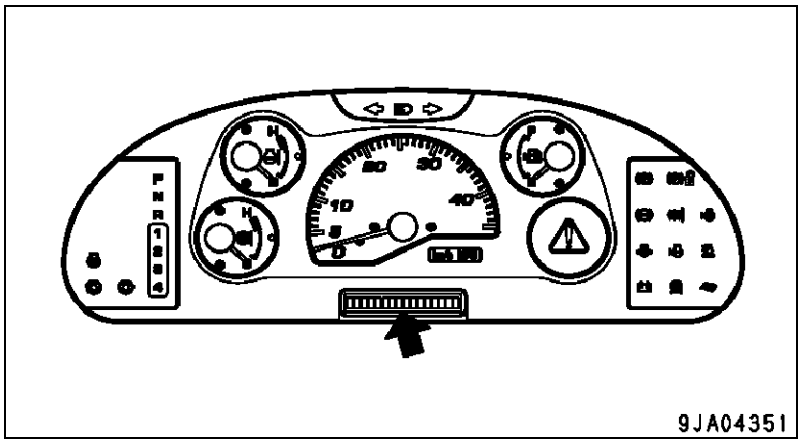
ENGINE SERIAL NUMBER AND EMISSION LABEL

The engine serial number is on a plate located on the right side of the machine.



SERVICE METER LOCATION

The service meter is located in the center bottom of the machines monitor bezel.



SERIAL NUMBERS AND DEALER INFORMATION

Model: WA320PT-5L

Machine #	
Engine #	

Dealer:

Address:

Phone #

Contacts:

NOTES:

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INTRODUCTION

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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 and quick 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 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.

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 “START-UP PRECAUTIONS AND CHECKS” on page (2-54)
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 (2-78)

Seat belt: See “INSIDE THE OPERATORS 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.

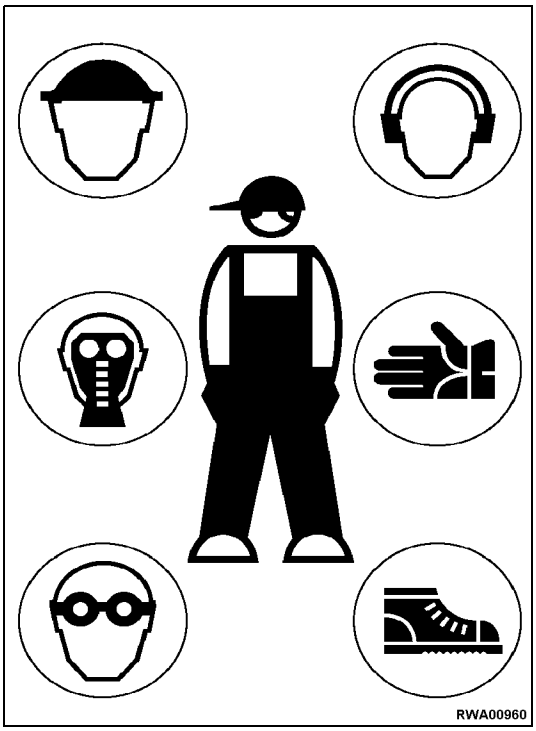
Avoid loose fitting clothing, jewelry and loose long hair. These can catch on controls or in moving parts and cause serious injury.

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.

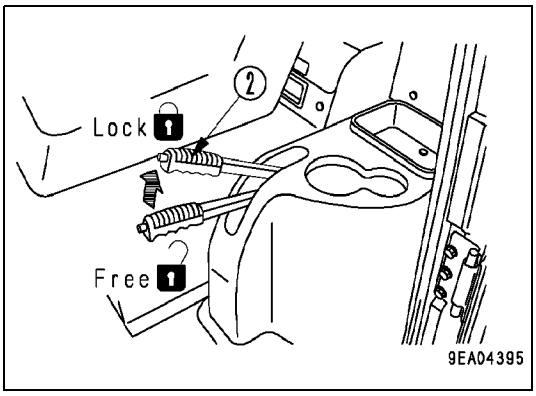


UNAUTHORIZED MODIFICATIONS

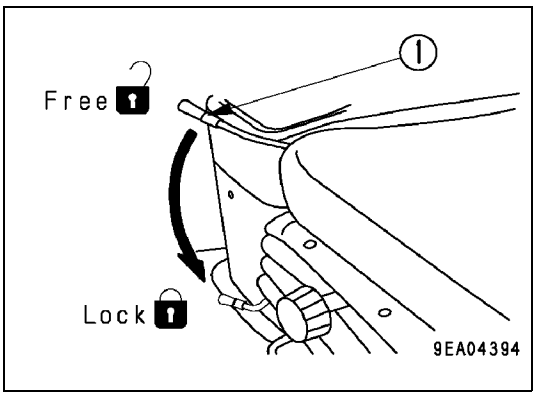
Any modification made without authorization from **Komatsu** can create a hazards. Before making any modifications, consult your local distributor. **Komatsu** will not be responsible for any injury or damage caused by any unauthorized modifications.

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 (2) in the (**LOCKED**) position.



3. Place safety lock lever (1) for loader control in the (**LOCKED**) position.
4. Turn the engine OFF, remove ignition key and keep the key with you.
5. 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 (2-78)

Lock: See "WORK EQUIPMENT LOCK LEVER" on page (2-34)

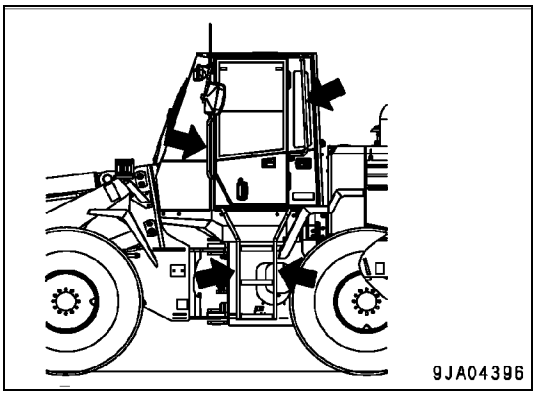
MOUNTING AND DISMOUNTING

When mounting or dismounting this machine, always be sure the work equipment is fully lowered to the ground and the engine is OFF.

Use all hand holds and step plates on your machine.

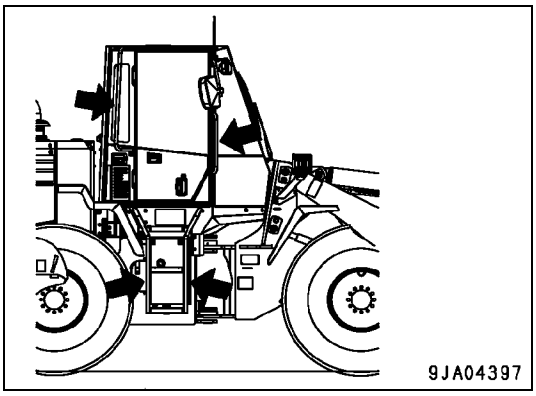
Never jump off or on to the machine.

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.

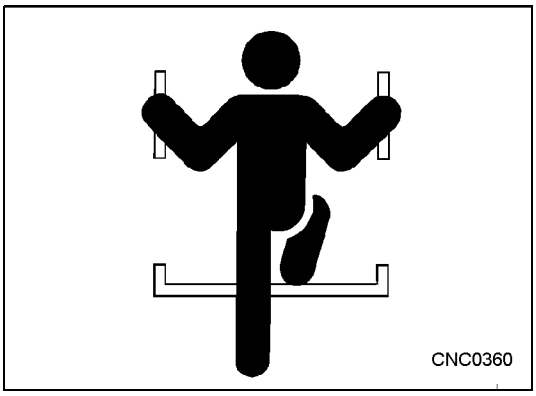


Never get on or off a moving machine. These actions may lead to serious injury. Always bring the machine to a full stop.

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

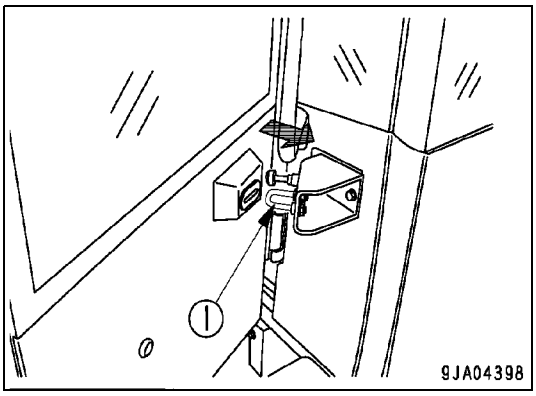


When getting on or off the machine, always face the machine and maintain a **Three Point Contact** (both feet and one hand or one foot and both hands) with the handrails, steps and platforms to ensure that you support yourself properly.



When entering the cab and opening the cab door, push the door open until it is securely into the door klatch (1) and held in position. Use the hand rails on the inside of the door while entering or exiting the cab.

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

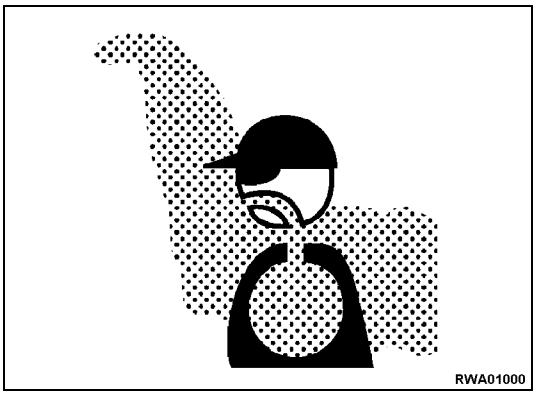


FIRE PREVENTION FOR FUEL AND OIL

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

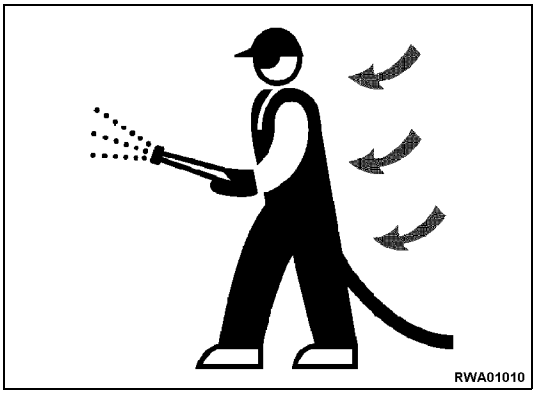
- Keep any open flames away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Refueling or adding oil should be made in well ventilated areas.
- Keep oil and fuel in its proper place.
- Clean up any fluid spills.

DUST HAZARD PRECAUTIONS

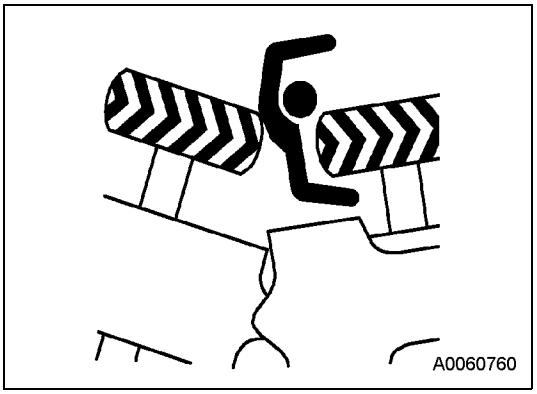


Dust can be hazardous to your health if it is inhaled. Komatsu does not use asbestos in its products, but if you handle materials containing asbestos fibers or other dust materials during demolition operations, always do as follows.

- 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.



CRUSH OR PINCH POINT DANGERS

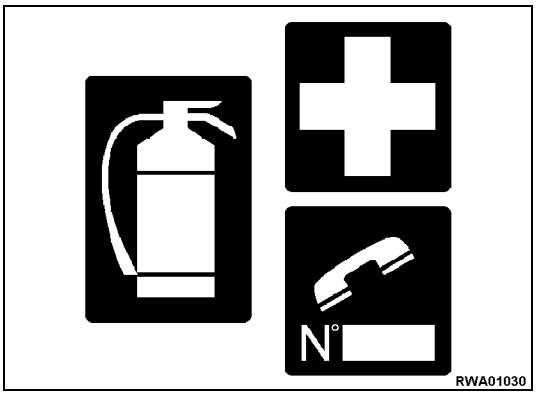


Never stand in or place any part of your body between the movable components such as the articulating portions of the machine or between the machines work equipment.

Keep in mind, when the machine 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.

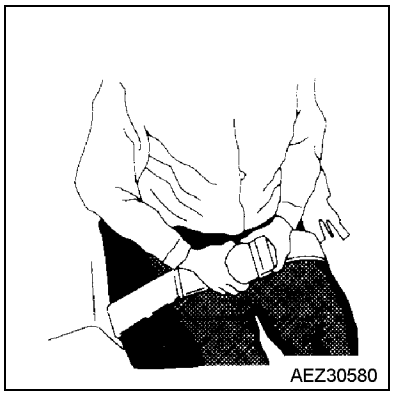
FIRE EXTINGUISHER AND FIRST AID KIT



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.

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.

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. 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. Never drill, cut or modify the ROPS structure, if the ROPS structure should become damaged in any way, replace it immediately. Do not make repairs to the ROPS structure its self.

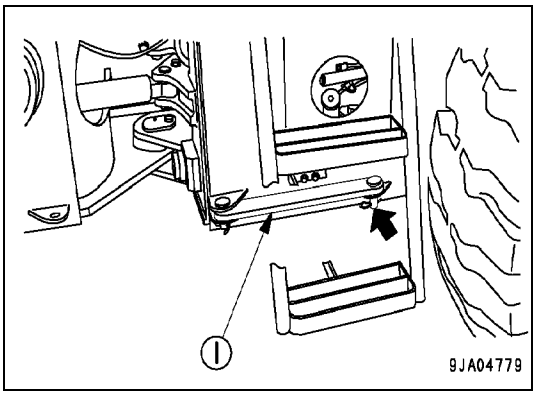
PRECAUTIONS FOR ATTACHMENTS

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**.

STARTING YOUR WORK OPERATIONS

Using the work equipment may pose some hazards that may damage the machine or injure the operator. It is important to be aware of some of these hazards to avoid becoming involved in them. A safety conscious operator is the most important insurance when on a job site. Below are several situations and information the operator should be aware of:

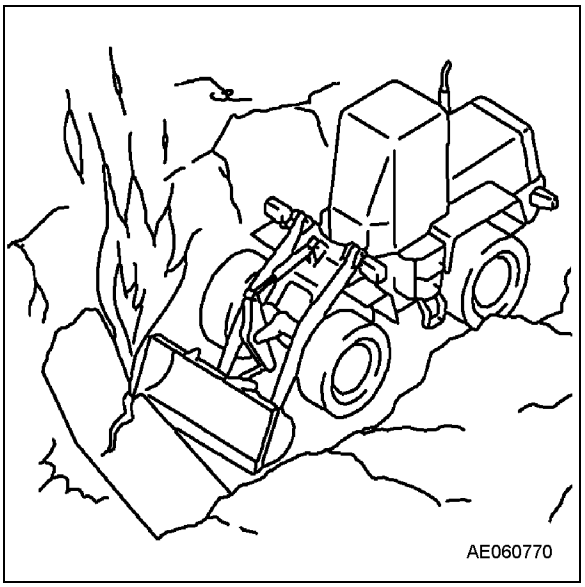
- Before operating the machine, walk around it and check for people or objects that might be in the way.
- Make sure the safety bar (1) is securely in place.
- Do not start the engine if warning tags have been attached to the steering wheel or control levers.
- Sound your horn to warn others in the area 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

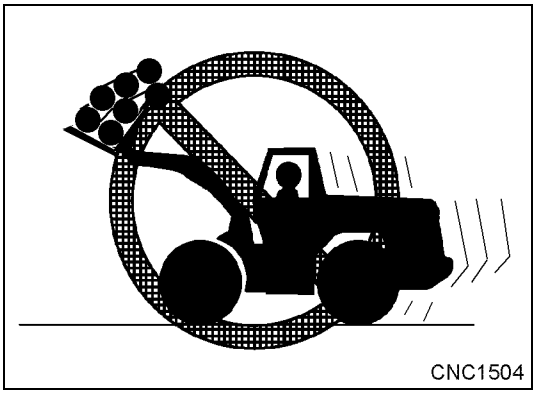
Before proceeding with any excavating or grading operations it is important to be aware of the hazards involved with this operation. Below is a list outlining what to do to avoid some of these hazards.

- Before starting any excavating or grading 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.

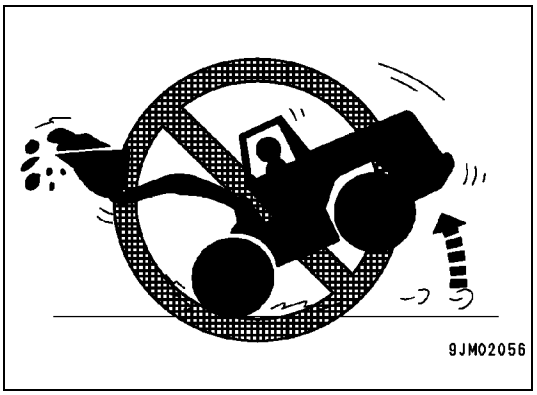


AVOIDING DANGEROUS SITUATIONS

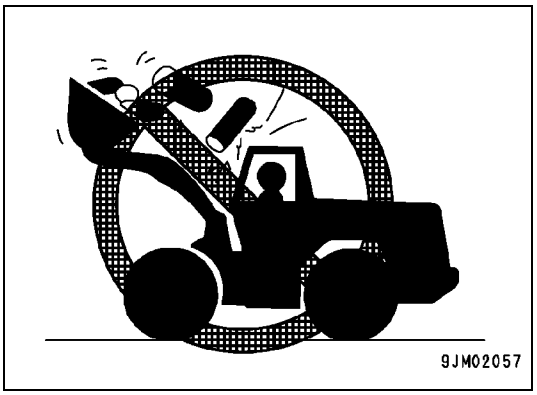
Avoid traveling with the tool carrier raised. Rasing the tool carrier raises the center of gravity on the machine. Traveling with a raised tool carrier, especially a loaded carrier may result in loss of control or a rollover situation. Never raise the tool carrier unless the machine is stopped.



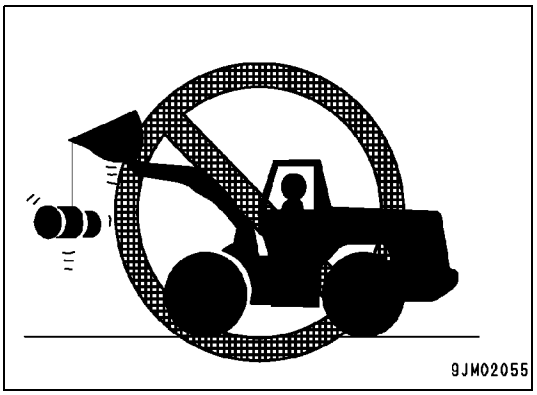
When the bucket is raised and loaded, never make sharp turns or stop the machine suddenly, this may cause the machine to tip forward.



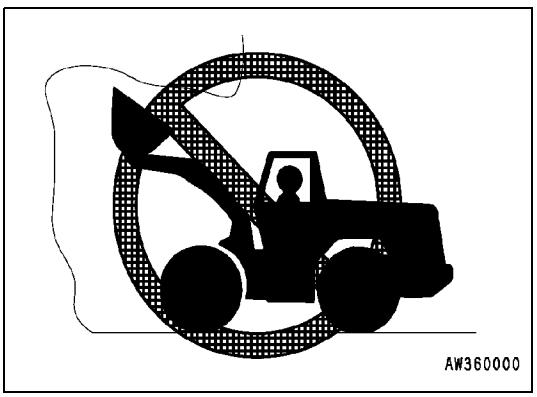
Always handle unstable loads carefully, avoid tipping the bucket back or raising the load too high. Be sure to operate the work equipment carefully and keep the load as close to the ground as possible.



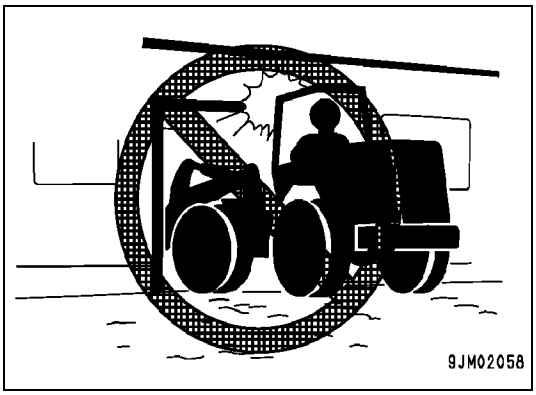
Do not use the bucket or lift arms as a crane. The object you are lifting may swing or shift causing the machine to tip, sway or possibly rollover.



Never work under overhangs or excavated bank areas. These could collapse and damage the machine or injure the operator.



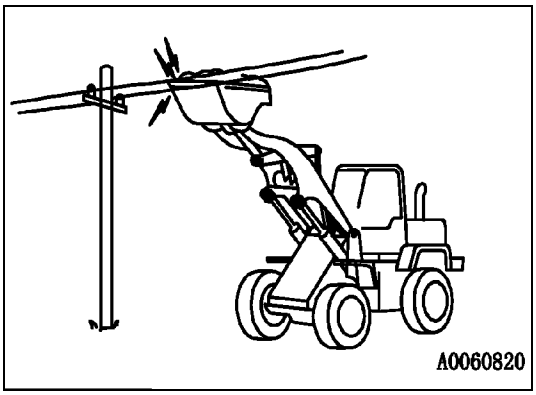
WORKING CLEARANCES



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.

.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.



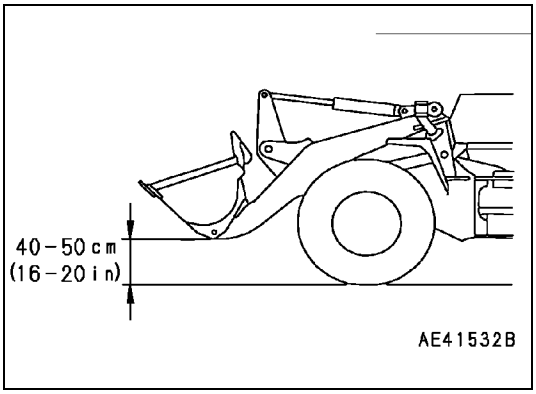
- Be aware of the dangers when working around overhead electrical lines, high humidity may pose an electrical hazard even if your machine clears the overhead power lines.
- If your machine should come in contact with overhead electrical lines, stop the machine and remain on the machine until the power 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.
500kV	11 m	36 ft.

RULES FOR ROAD TRAVEL

Traveling with your machine may pose some hazards. When traveling, always travel in a safe manor and remain alert at all times A safety conscious operator is the most important insurance when traveling with the machine. Below are several situations and information the operator should be aware of:

1. Raise the loader bucket to a safe travel height of 40-50 cm (16-20 in) from the ground, lock the loader control levers using the safety lock equipped with the machine.



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

3. Never turn the ignition key off when traveling. If the engine should stop, apply the brakes and stop the machine immediately.

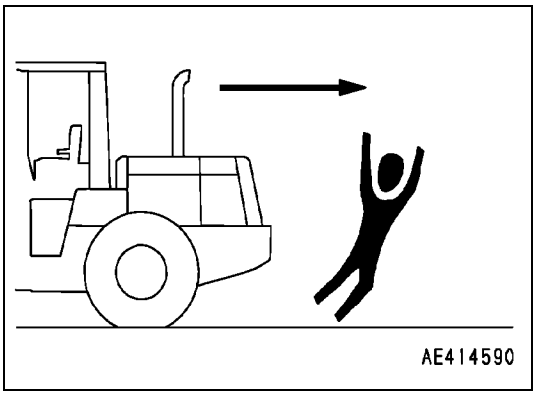
4. Always be aware of your clearances and road surface. Some areas may not support the weight of your machine. Plan your rout in advance. If necessary, obtain the aid of an escort to lead or prepare your travel rout.

5. Never travel at high speeds, loss of control or tire damage may result.

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:

- 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.

TRAVEL ON SLOPES

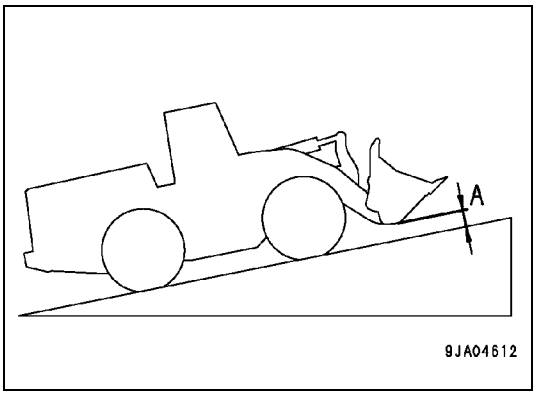
Traveling on slopes may pose a hazard. In order to prevent tipping the machine or losing control it is important to follow some basic simple rules:

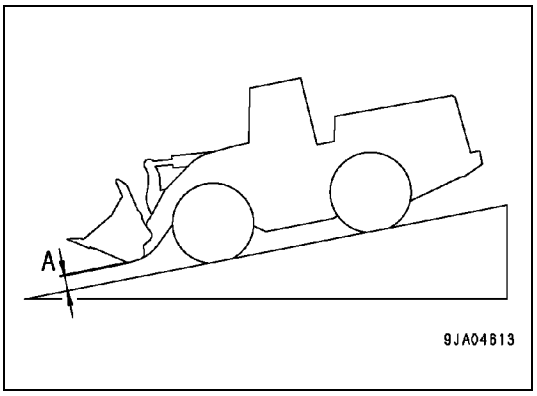
.

Never turn the ignition key off when traveling up or down a slope. If the engine should stop, apply the brakes and stop the machine immediately.

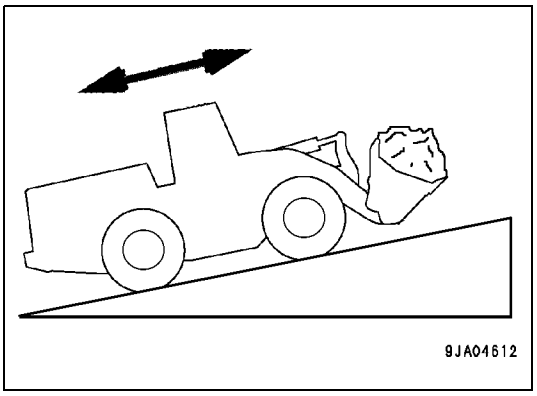
When traveling over rough ground travel at a slow controllable speed.

When traveling up or down slopes with an empty bucket it is important to travel at a safe controllable speed with the bucket set in position "**A**" 20 to 30 cm (8 to 12 in) above the ground.

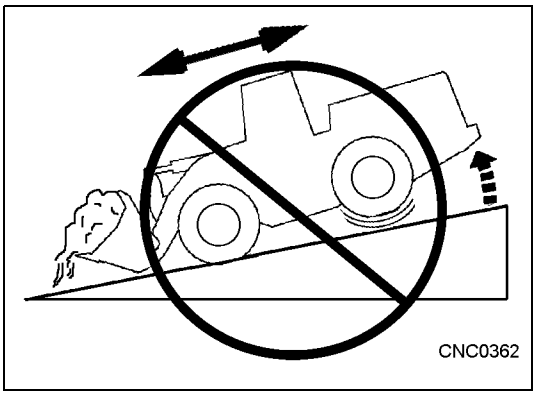




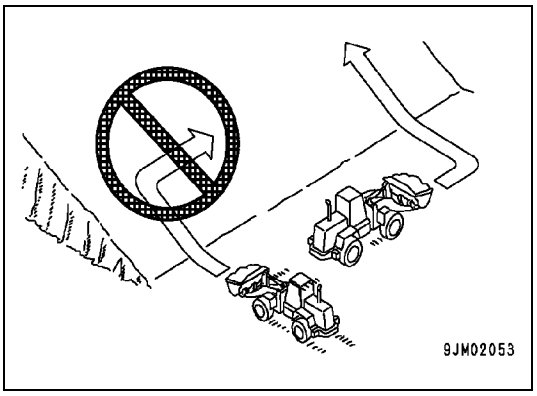
When traveling up or down a slope with a load, always keep the bucket 20 to 30 cm (8 to 12 in) above the ground and the load facing the top of the hill.



Never travel up or down a slope with the load facing the bottom of the hill. Loss of control may result when the brakes are applied.



Always travel straight up or straight down a slope, traveling at an angle on a slope may cause the machine to tip or possibly rollover.



PARKING THE MACHINE

When parking the machine it is important to follow several basic safety rules. Keep in mind you are responsible for the security of the machine when it is parked. Below is a list if some basic rules to follow when parking your machine.

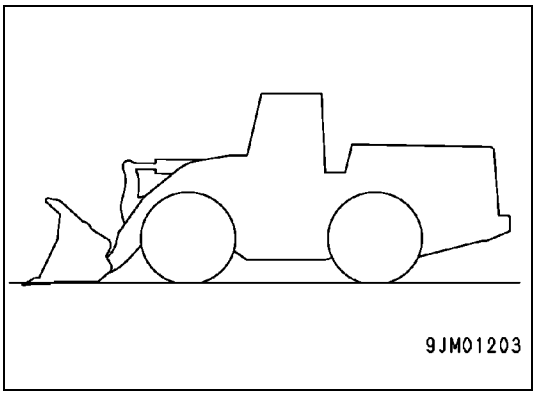
1. Always park the machine on a flat level location away from moving equipment, pedestrians or traffic.

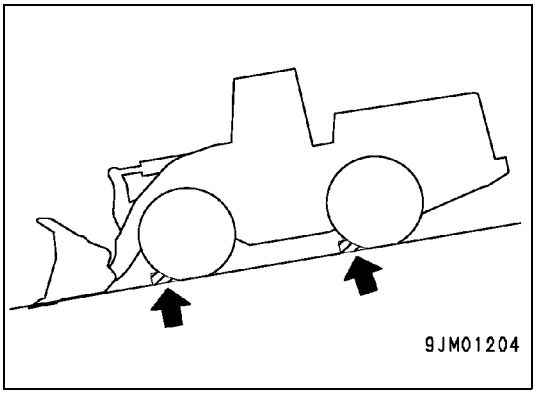
2. Lower all work equipment on to the ground and neutralize all controls.

3. Remove the ignition key, set the parking brake in the "**PARK**" mode and lock the controls. See "LEAVING THE OPERATORS COMPARTMENT on page (1-4)

4. Be sure all access panels, cab, fuel and oil tanks are locked and secure to prevent tampering with the machine while unattended.

5. Avoid parking the machine on a slope of any kind. If you must park on a slope, park with the bucket facing down the slope and the wheels blocked to prevent any movement of the machine.





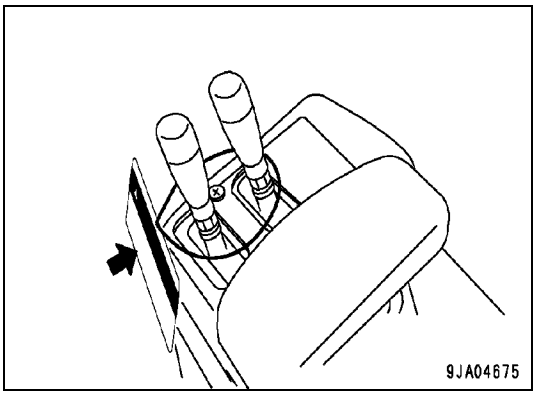
PRECAUTIONS DURING MAINTEMANCE OPERATIONS

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

For machines equipped with the Electronically Controlled Suspension System (ECSS) be sure the system is off before proceeding with any maintenance procedures.

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



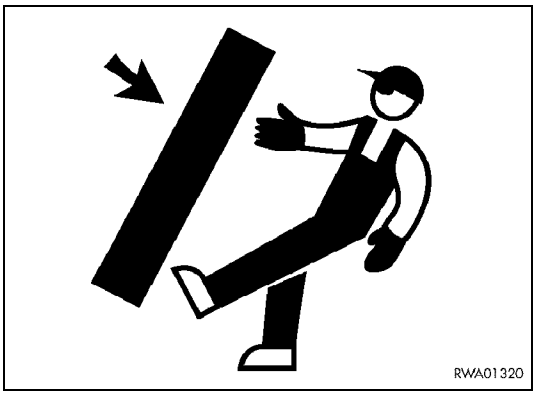
Lock the equipment controls, remove the ignition key and tag the steering wheel.

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.

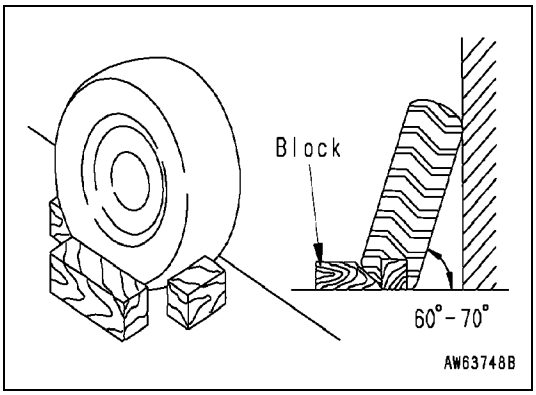
If the machine will be down for maintenance for a long period of time, be sure to check and see if the warning tags are still in place before you start your repair procedures the next day.

EQUIPMENT STORAGE

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



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

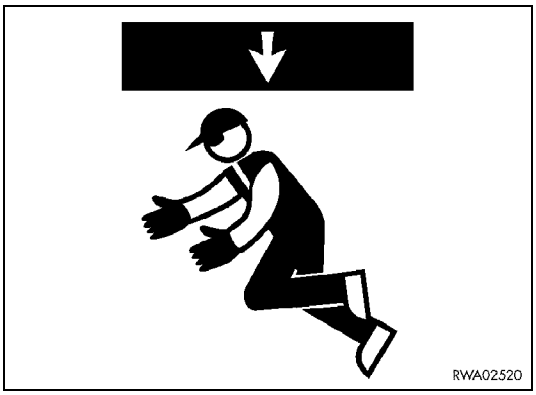


WORKING UNDER THE MACHINE

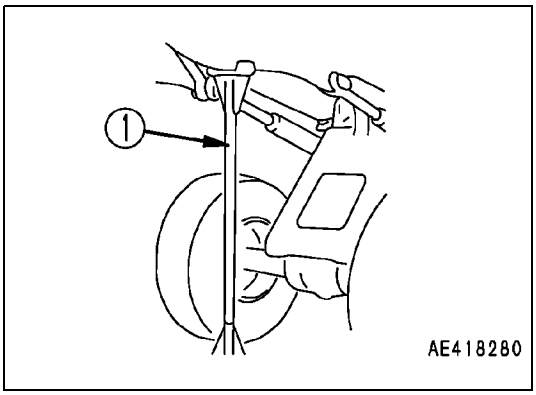
Always use approved jack stands to support the machine when performing maintenance under the chassis.

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.

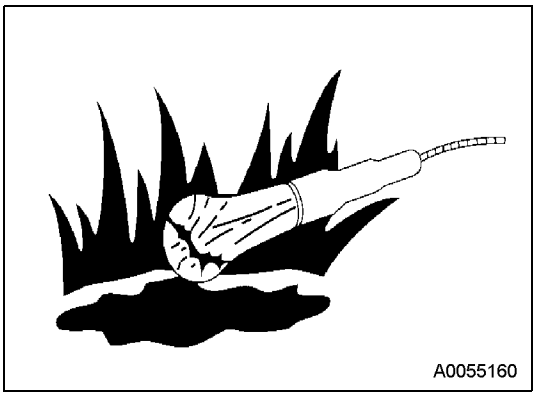


When carrying out maintenance or repairs with the bucket raised, always support the bucket safely with the proper support (1) as shown in the illustration.

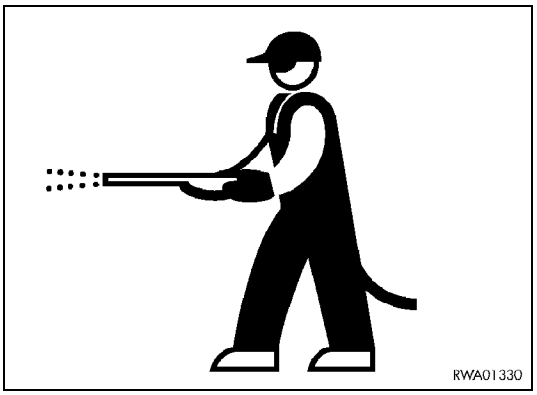


USING DROP LAMPS

Use only approved anti-explosion proof lamps when checking fuel, oil, or 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.

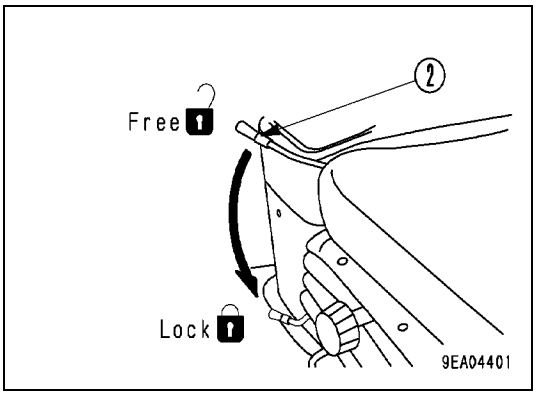
Avoid using high pressure steam cleaners or caustic soaps to wash the machine if possible. Steam cleaning or using caustic soaps may damage paint, wiring or sensitive electrical components.

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.

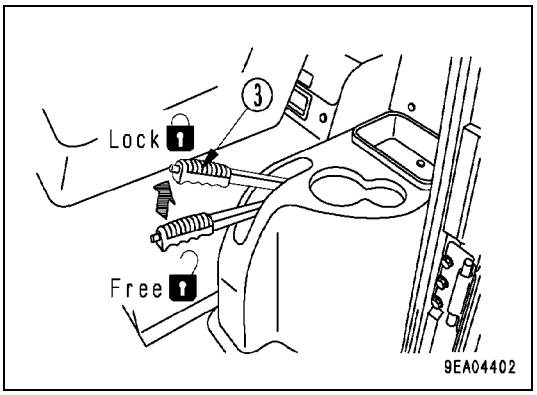
RUNNING THE MACHINE DURING MAINTENANCE



If during maintenance the engine must be run have someone remain in the operator's seat while the engine is running. This is if the engine must be shut down quickly.

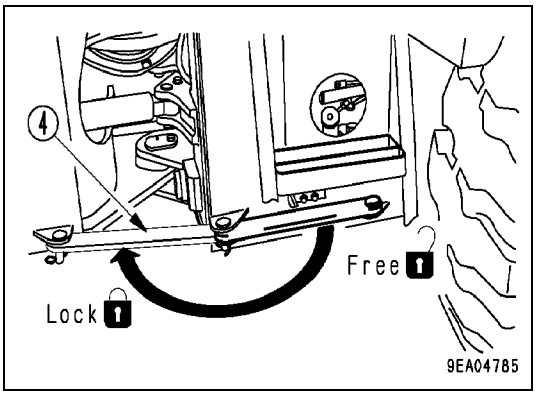
Be sure all work equipment is "**LOCKED**" (2) and the ECSS system is off.

For machines equipped with the Electronically Controlled Suspension System (ECSS) be sure the system is off before proceeding with any maintenance procedures.

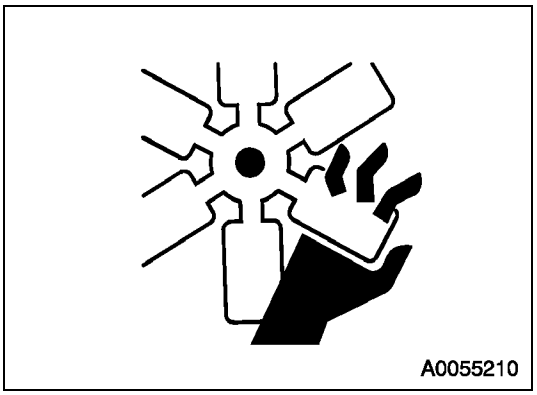


Set the parking brake (3) in the "**LOCK**" mode and instruct the person sitting in the cab not to operate any controls unless instructed to.

Always lock the front and rear frames with the safety bar (4).



Be aware of rotating parts while the engine is running.



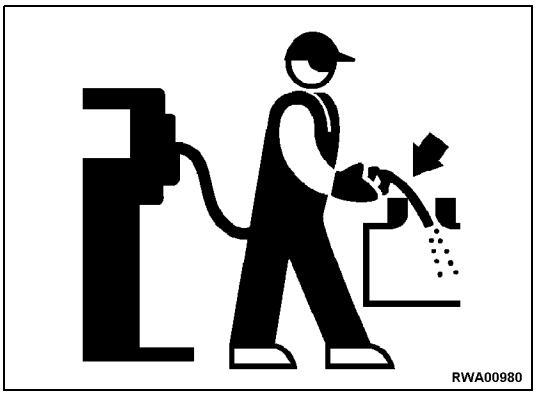
RULES FOR REFUELING THE MACHINE

Always clean up any spills. Grease, fuel, oil or coolant spills can pose a trip hazard if not mopped 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 ventilated area. Never smoke or allow open flames near you while you are refueling the machine.

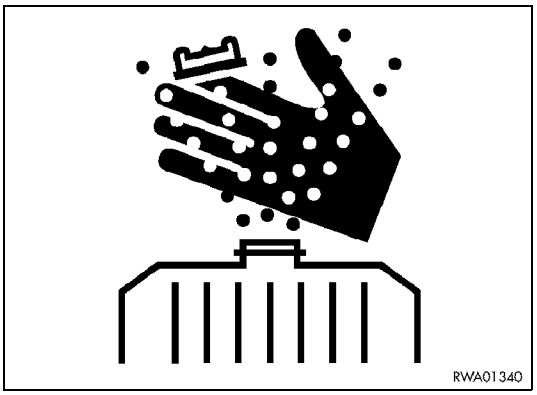
Never mix gasoline with diesel fuel. Gasoline is extremely flammable and could cause an explosion. Do not fill the fuel tank completely, leave room for the fuel to expand.



COOLING SYSTEM PRECAUTIONS

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 properly. Failure to do so is in violation of the law.

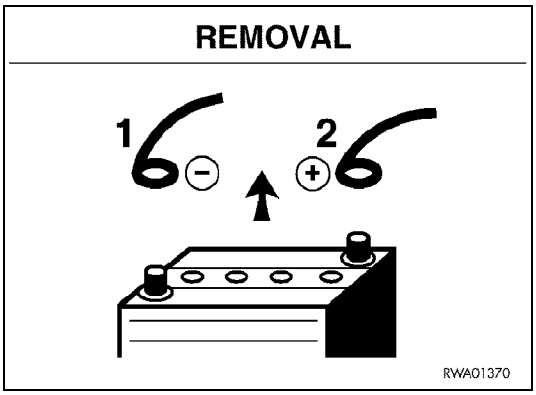


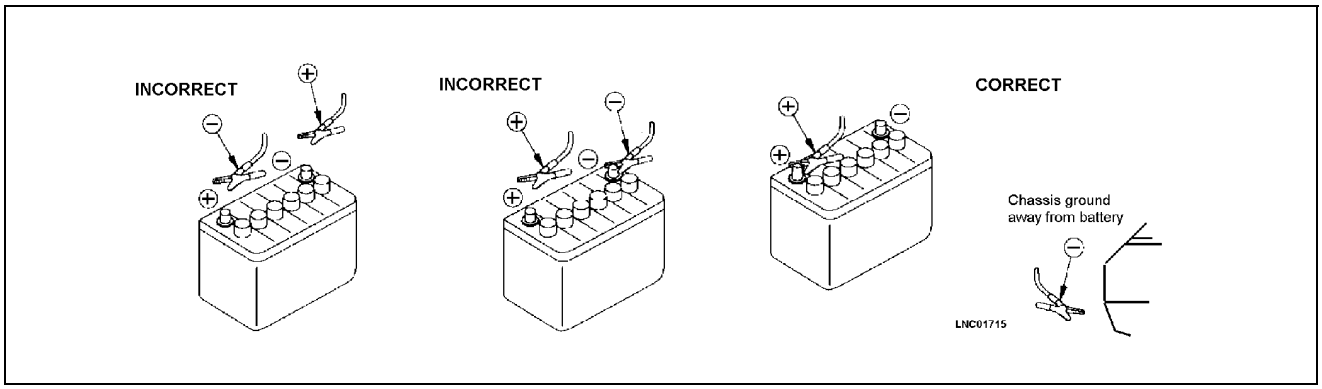
BATTERY PRECAUTIONS

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.

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.



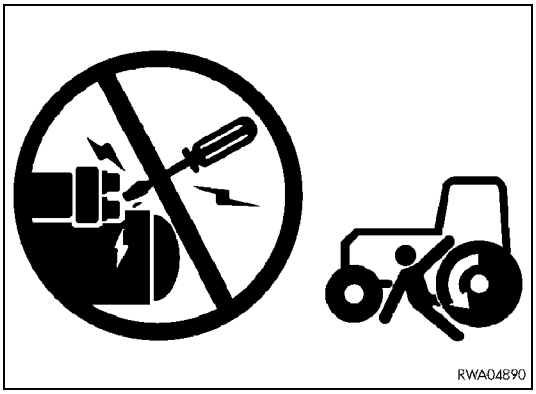


STARTING THE MACHINE

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.

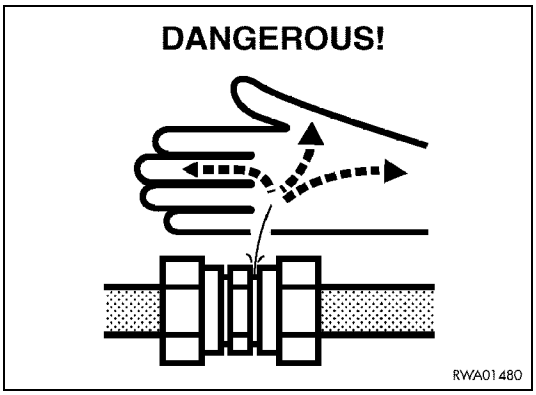
See “BASIC TROUBLESHOOTING” on page (3-2)



⚠ WARNING

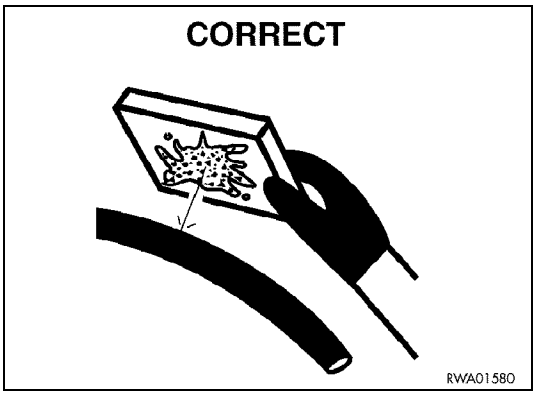
Never use a welder or a machine with a higher voltage system to jump start the machine. Using a higher voltage to jump-start a machine may damage the machines electrical system or cause an unexpected explosion or fire. Always jump-start a machine with equal voltages

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.



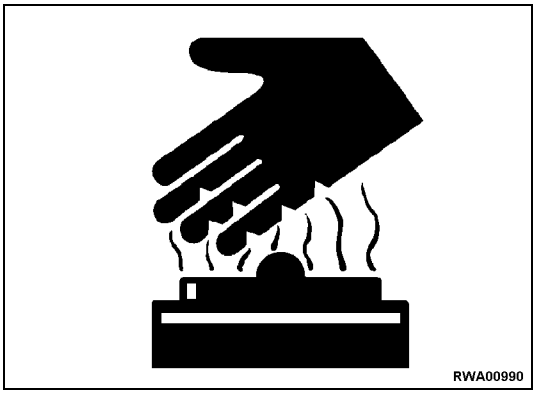
Remember that working hydraulic systems are always under pressure. If you have to add or drain hydraulic fluid, service or inspect the hydraulic system, lower the equipment to the ground and release system pressure and residual tank pressure before starting any work.

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 for leaks.

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.

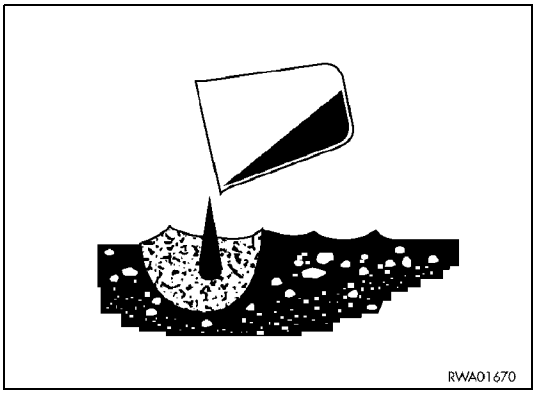
HIGH TEMPERATURES AREAS



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.

DISPOSAL OF WASTE MATERIALS

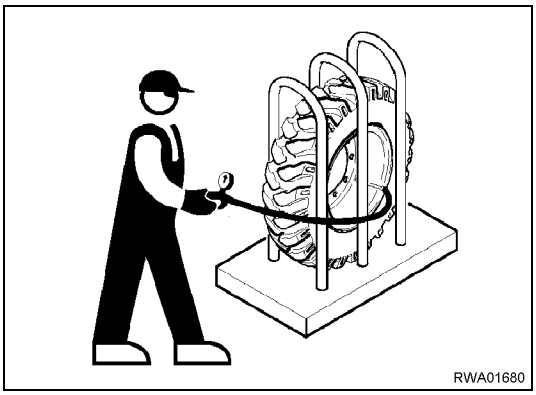


Never dump waste fluids in a sewer system, on the ground in rivers, etc.

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.

INFLATING TIRES



Always bear in mind that tires can burst while being inflated, causing serious accidents. Before servicing the tires, observe the following precautions:

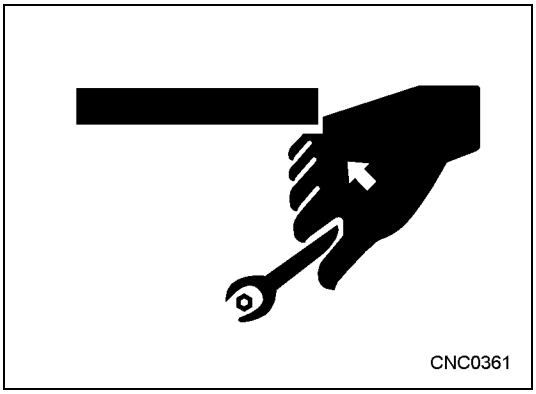
- Before inflating tires, always check the wheel rims, tire walls and tread for cuts, broken cords, or other damage.
- Have a tire expert perform checks and tire maintenance.
- When inflating tires, use a protective cage, and a compressed air gun with extension hose and pressure gauge.
- Make sure there is nobody in the vicinity before starting to inflate a tire. Stand at the tread side of the tire to inflate it.

ACCUMULATOR

This machine is equipped with an accumulator charged with high-pressure nitrogen gas. Before servicing the accumulator, observe the following precautions:

- Do not dissemble the accumulator.
- Do not expose the accumulator to high heat or an open flame.
- Do not weld on the accumulator.
- Do not drill or cut the accumulator.
- Do not strike or crush the accumulator.
- When replacing or disposing of the accumulator, always release the nitrogen pressure from the chamber.

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:

- Seat belts.
- 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 “WEAR PARTS” on page (3-7)

VIBRATIONS TO WHICH THE OPERATOR IS EXPOSED

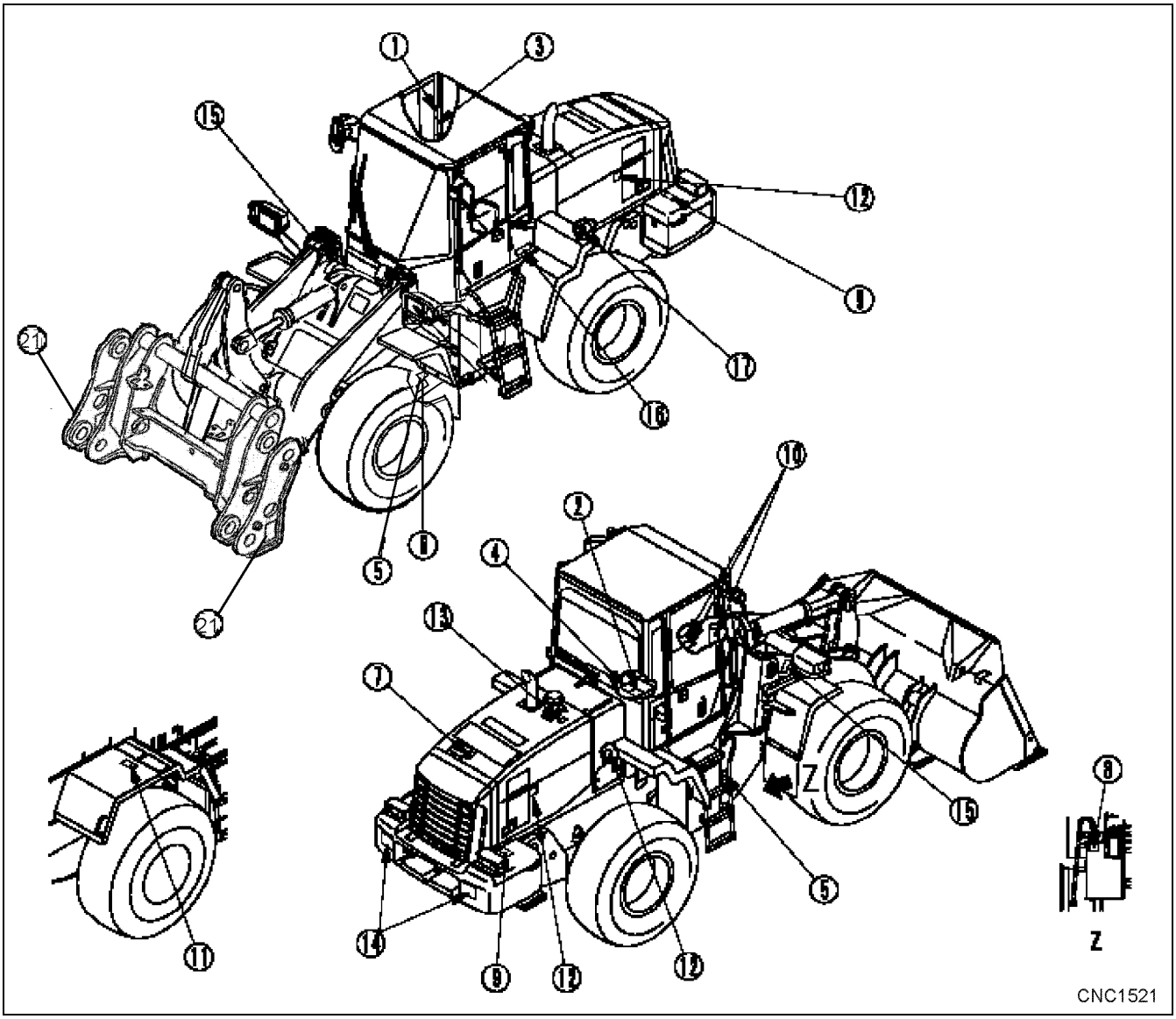
According to test results carried out to determine the vibrations transmitted to the operator by the machine, the upper limbs are subjected to vibrations lower than 2.5 m/sec^2 (8.2 ft/sec^2). The seated part of the body is subject to vibrations lower than 0.5 m/sec^2 (1.7 ft/sec^2).

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.

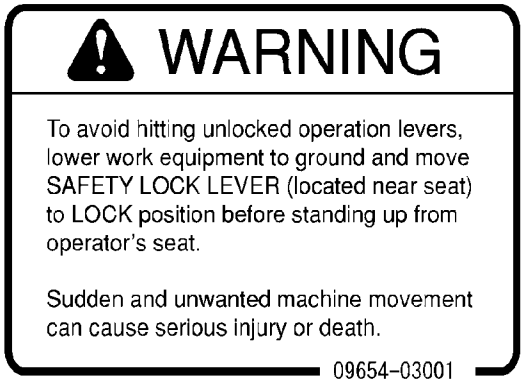
LOCATION OF THE SAFETY DECALS

- 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.



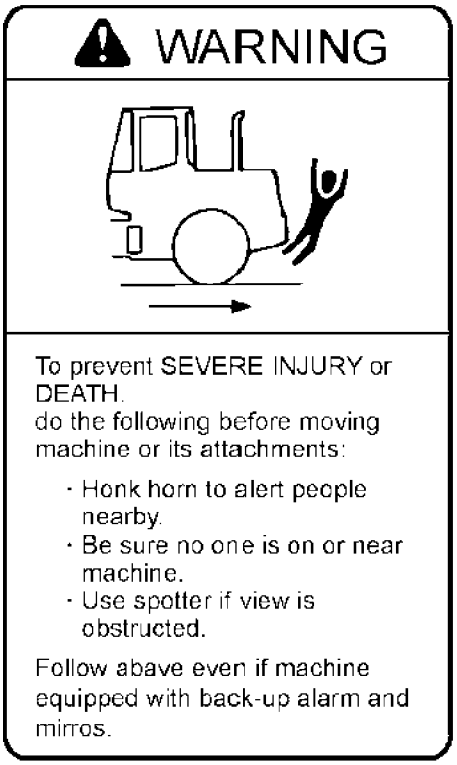
1. Warning decal before start-up:
- Improper operation can be hazardous.
- Read the operators manual before operating.
- Keep the operators manual with the machine.

2. Safety lock lever decal:
- Avoid hitting the unlock lever.



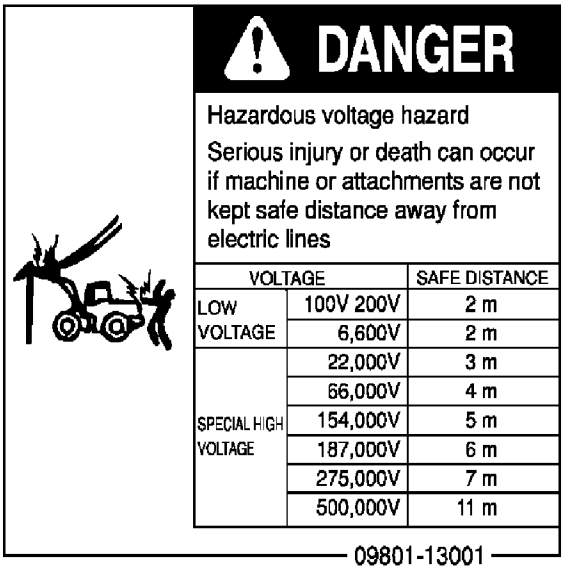
3. Reverse travel decal:

- Honk horn to alert people you are traveling in reverse.
- Be sure no one is near your machine.
- Use a spotter if your visibility is restricted.



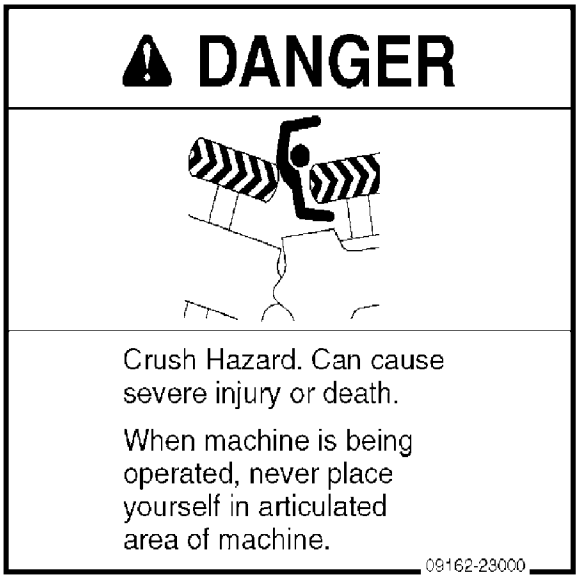
4. Voltage clearance warning decal:.

- Be aware of your clearances when working around high voltage.



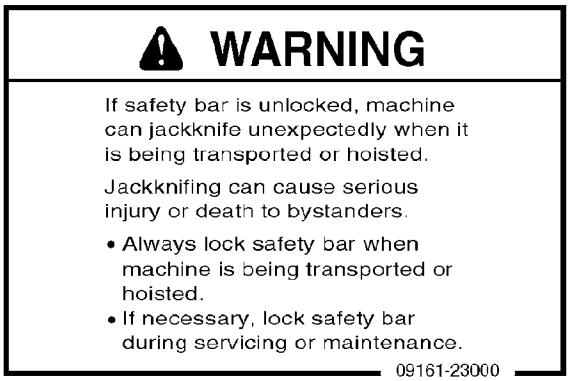
5. Pinch point danger decal:

- Stay clear of machine when in operation.



6. Safety bar warning decal:

- Always lock the safety bar when machine is being transported.
- If necessary lock the safety bar when servicing machine.

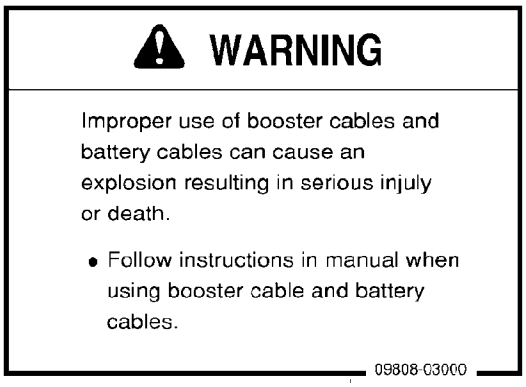


7. Hot coolant warning decal:

- Turn engine off.
- Allow the engine to cool down.
- Slowly loosen the radiator cap.

8. High temperature oil warning decal:
- Turn engine off.
- Allow oil to cool down.
- Slowly loosen oil fill cap.

9. Booster cable warning decal:
- Follow instructions in the manual when using booster cables.



10. Accumulator warning decal:
- Keep away from open flame.
- Do not weld.

11. Location warning decal:
- Do not climb on the fender.

12. Do not open warning decal:
- Do not open cover.
- Keep away from fan and fan-belt.

13. Ether use warning decal:
- Do not use ether to start the engine.

14. Maintain safe distance warning decal:
- Always keep a safe distance from the machine when in operation.

15. Work equipment warning:
- Stay clear of work equipment.

16. Do not modify decal:
- Do not make modifications to this component.

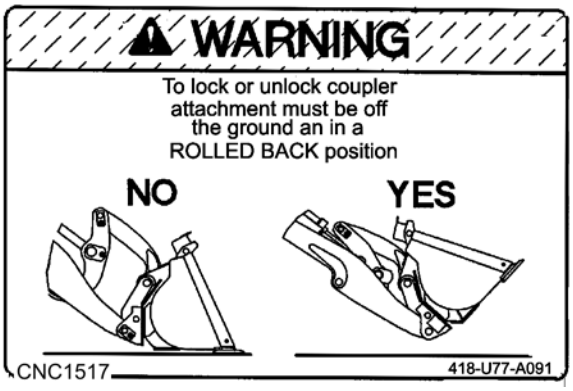
17. Jump start warning decal:
- Do not jump start the machine at the starter.

18. Attachment latch warning.
- Be sure the attachment is fully locked in place.
  - (In Cab)

19. Lock pin extension.
- Be sure the lock pin extension is properly locked into the attachment.
  - (In Cab)

20. Coupler switch.
- Be sure the coupler switch system is locked in place before starting the machine.
  - (In Cab)

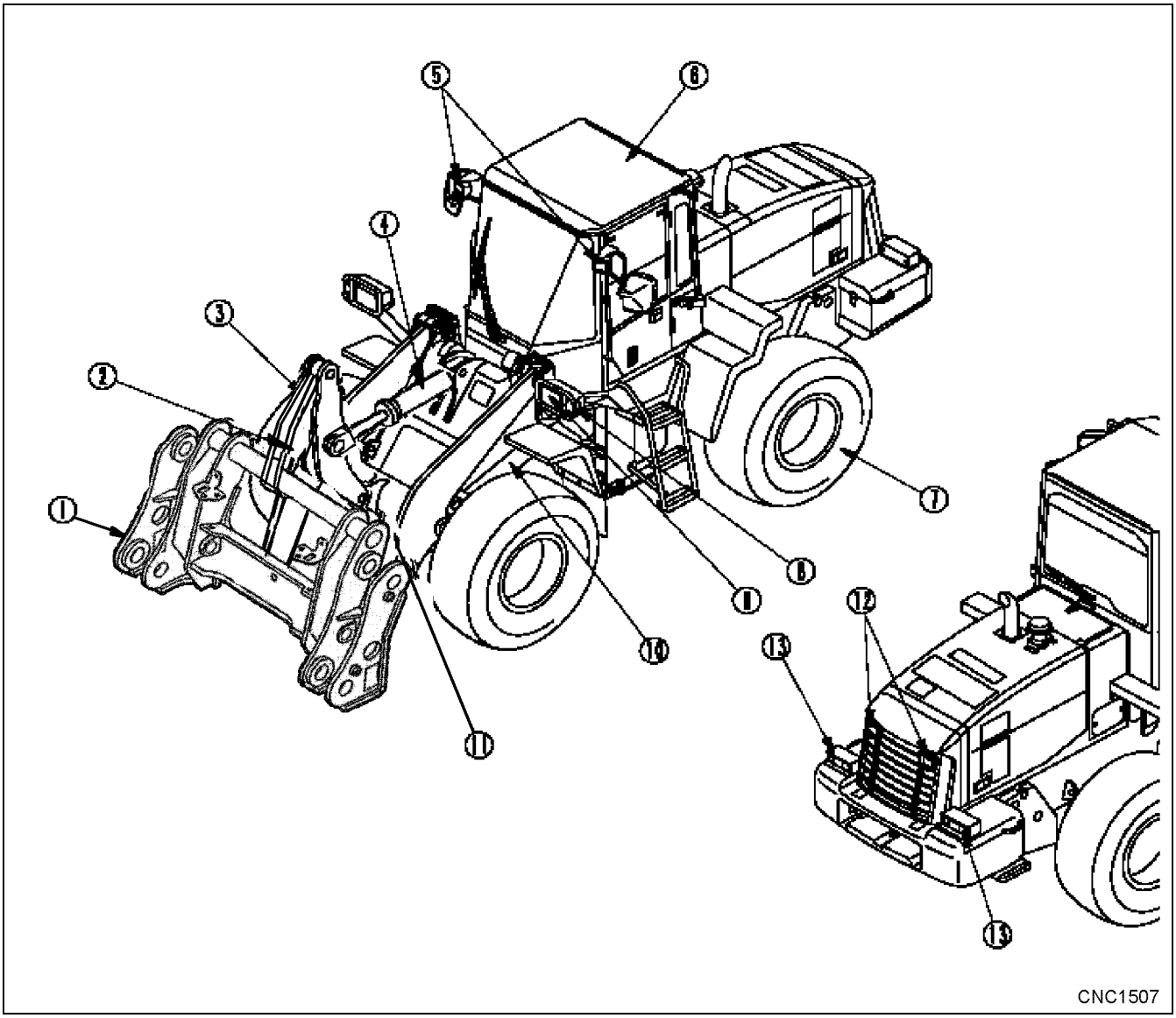
21. Attachment lock release position.
- Be sure the bucket is in the proper position before releasing the latch.



OPERATION

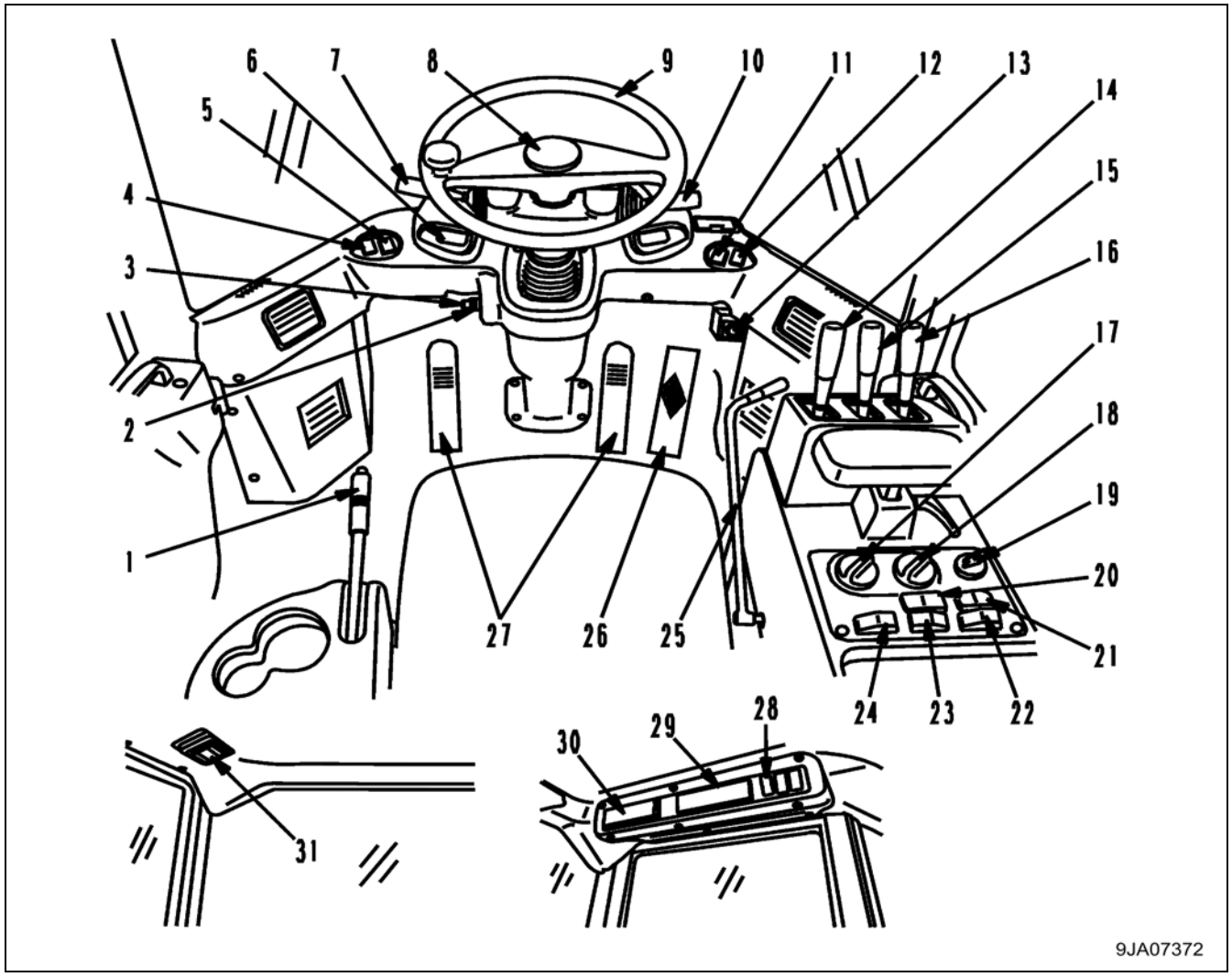
GENERAL VIEW OF MACHINE

OUTSIDE VIEW OF THE MACHINE



1. Tool Carrier Unit
2. Tilt Lever
3. Front Wheels
4. Bucket Cylinder
5. Front Work Lamps
6. ROPS and Cab
7. Rear Wheels
8. Turn Signal Lamps
9. Head Lamps
10. Lift Cylinder
11. Lift Arm
12. Back-up Lamps
13. Rear Work Lamps

INSIDE VIEW OF THE CAB

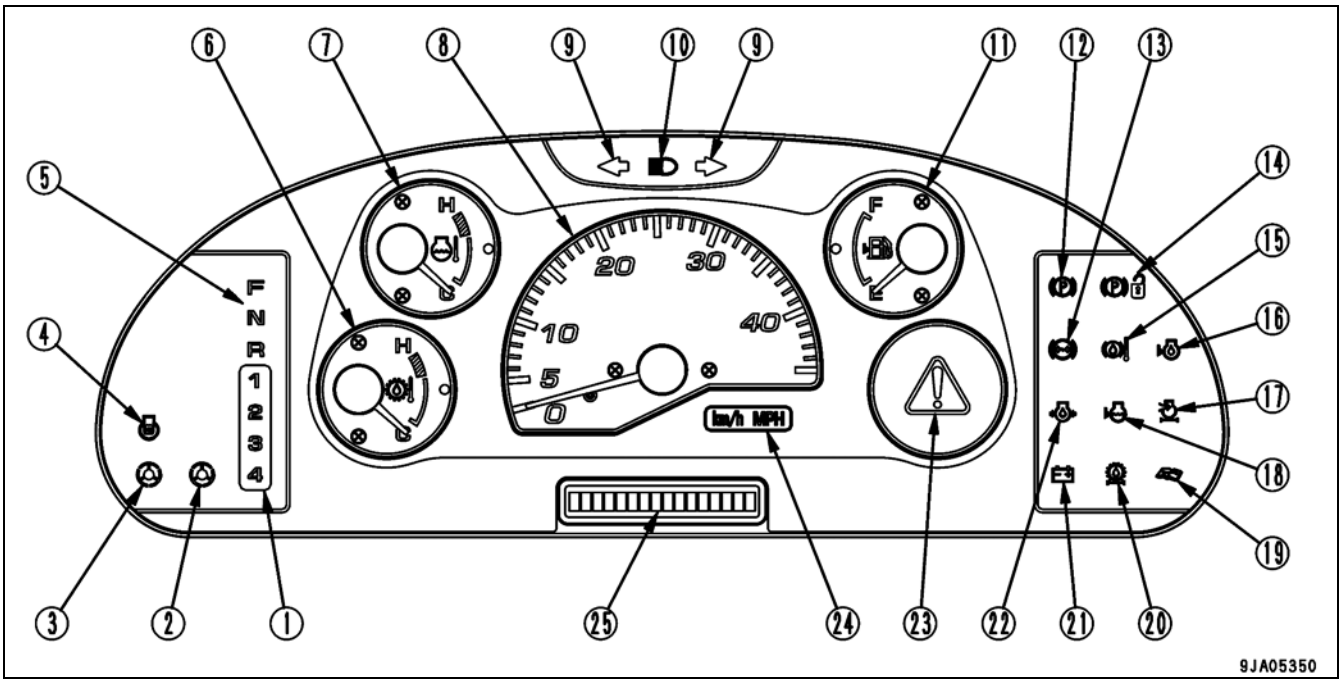


1. Parking Brake Lever
2. Rear Wiper Switch
3. Front Wiper Switch
4. Front Work Lamp
5. Rear Work Lamp
6. Hazard Lamp Switch
7. Directional Lever
8. Horn Switch
9. Steering Wheel
10. Head Lamp/Turn Signal/Dimmer Switch
11. Monitor Mode Select Switch 1
12. Monitor Mode Select Switch 2
13. Cigarette Lighter
14. Auxiliary Control Lever
15. Bucket Control Lever
16. Lift Arm Control Lever
17. Variable Shift Control Switch
18. Speed Range Selector Switch
19. Ignition Switch
20. E.C.S.S. Switch (if equipped)
21. Traction Control Switch
22. Attachment Select Switch
23. Dump Speed Switch
24. Quick Coupler Switch
25. Work Equipment Lock Lever
26. Accelerator Pedal
27. Brake Pedal
28. Rear Heated Glass Switch
29. Air Conditioner Panel
30. Radio (if equipped)
31. Room Lamp Switch

DESCRIPTION OF ALERTS, GAUGES AND MONITOR SYSTEM

Before operating the machine it is important to understand all the functions equipped with your machines monitor. Operating the machine without knowledge of all the alert systems may damage the machine, property or possibly cause injury to the operator. Below is a description of all monitoring functions.

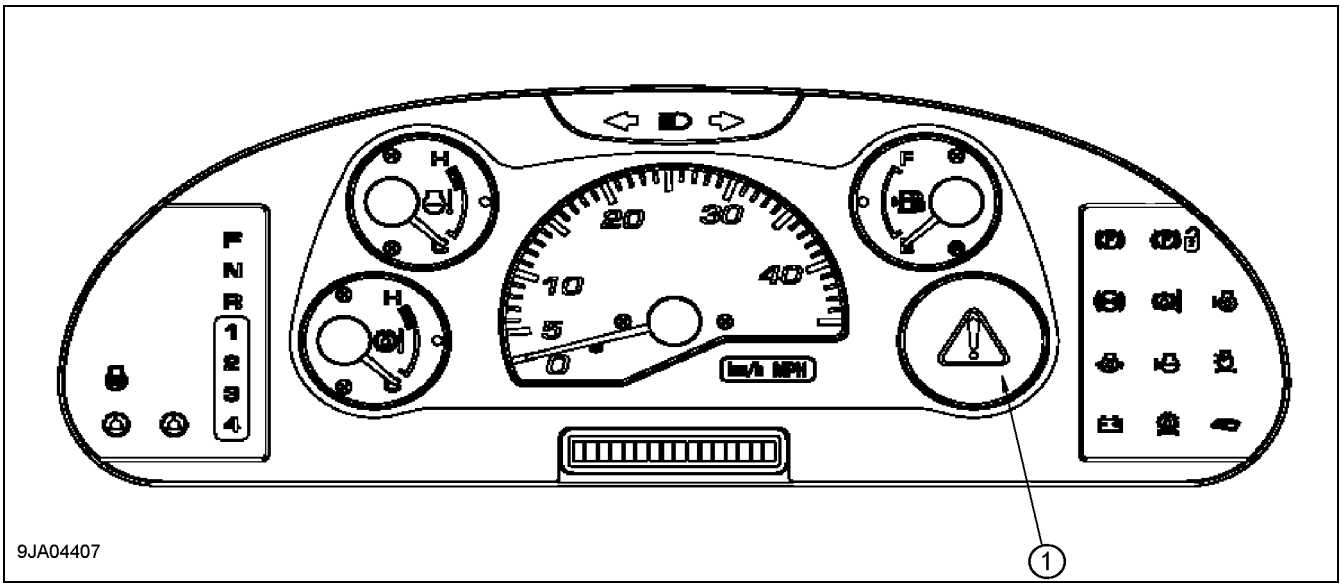
INSTRUMENT BEZEL



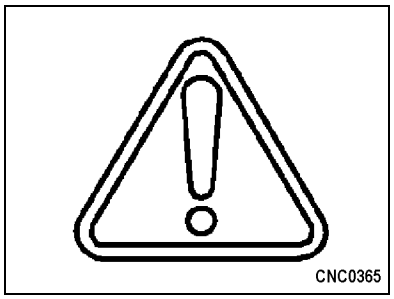
1. Speed Range Selector Lamp
2. Steering Oil Pressure Lamp
3. Emergency Steering Lamp
4. Preheating Lamp
5. Directional Lever Lamp
6. HST Oil Temperature Gauge
7. Engine Coolant Temperature Gauge
8. Speedometer
9. Turn Signal Lamp
10. Head Lamp High Beam Indicator Lamp
11. Fuel Level Gauge
12. Parking Brake Lamp
13. Brake Oil Pressure Caution Lamp
14. Parking Brake Caution Lamp
15. Axle Oil Temperature Caution Lamp
16. Engine Oil Level Caution Lamp
17. Air Cleaner Clog Warning Lamp
18. Radiator Coolant Level Lamp
19. Maintenance Caution Lamp
20. HST Oil Filter Clog Warning Lamp
21. Battery Charge Indicator Lamp
22. Engine Oil Pressure Warning Lamp
23. Central warning Lamp
24. Meter Display Lamp
25. Character Display

CENTRAL WARNING LAMP

If any abnormality occurs in the machines system, the (Central Warning Lamp) and an audible alarm will sound intermittently. The lamp for the location of the abnormality will light up also. If this lamp is illuminated during operation of the machine, park the machine in a safe location, lower the work equipment, set the parking brake and shut the engine "OFF". Contact your local **Komatsu** Dealer for repairs.Do not operate the machine until repairs have been made



This display (1) lights up if any emergency stop item, caution item, or incorrect operation of any switch or control occurs. At the same time, the alarm buzzer sounds. If this warning lamp should illuminate along with the audible buzzer, stop the machine immediately and investigate the problem. Failure to do so may result in damage to the machine.

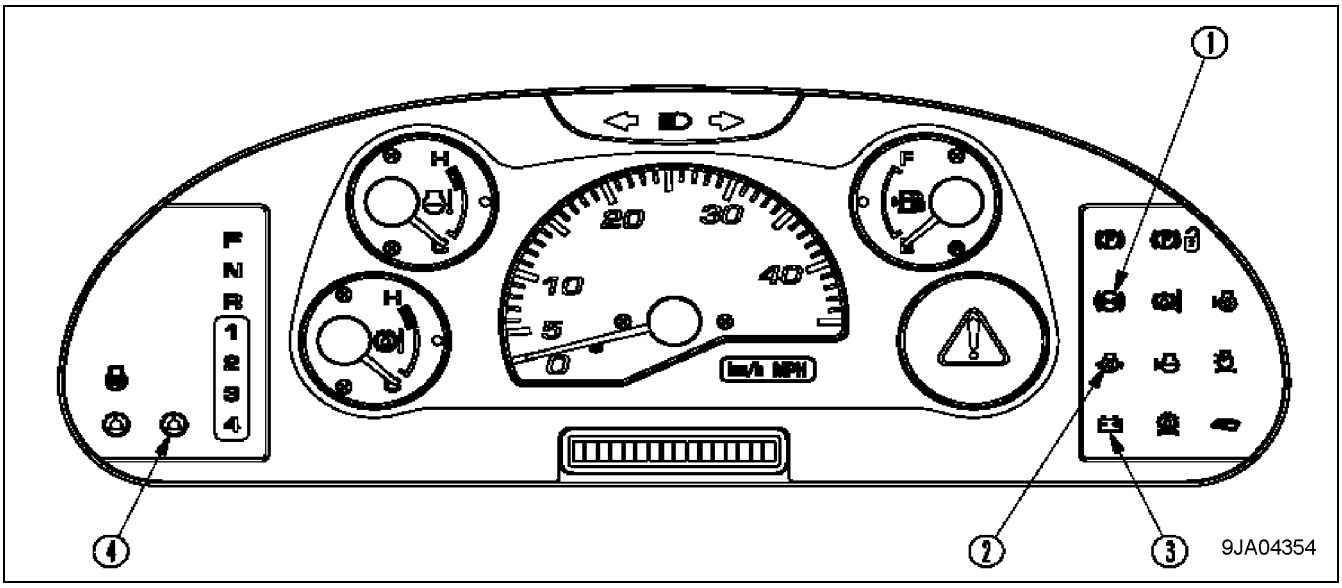


CENTRAL WARNING LAMP

When the central warning lamp comes on, this is an indication to stop the machine immediately. There is also a warning buzzer that will sound along with this lamp. If this lamp should come on during operation, move the machine to a safe area and shut the machine down immediately.

EMERGENCY STOP WARNING SYSTEM

If any abnormality occurs in the (Emergency Stop Warning System), an audible alarm will sound intermittently. The lamp for the location of the abnormality will light up also. If any of these lamps are illuminated during operation of the machine, park the machine in a safe location, lower the work equipment, set the parking brake and shut the engine “OFF”. Contact your local **Komatsu** Dealer for repairs.Do not operate the machine until repairs have been made.

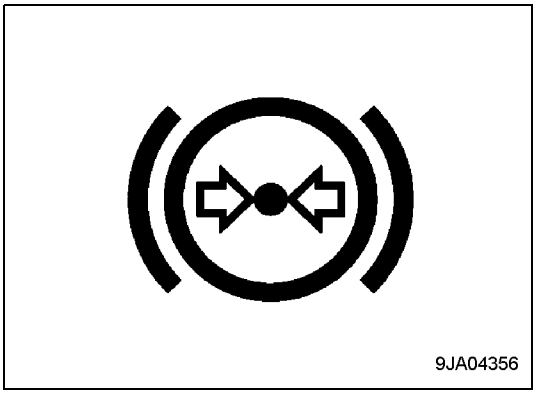


1. Brake Pressure Warning Lamp	2. Oil Pressure Warning Lamp
3. Battery Charge Warning Lamp	4. Steering Oil Pressure Warning Lamp (red)

BRAKE PRESSURE WARNING LAMP

Lamp (1) monitors the brake oil pressure. If the brake oil pressure goes below the specified set value, the brake oil pressure warning lamp as well as the central warning lamp will light up and the alarm buzzer will sound. At this point stop the machine immediately and do not operate it until repairs have been made.

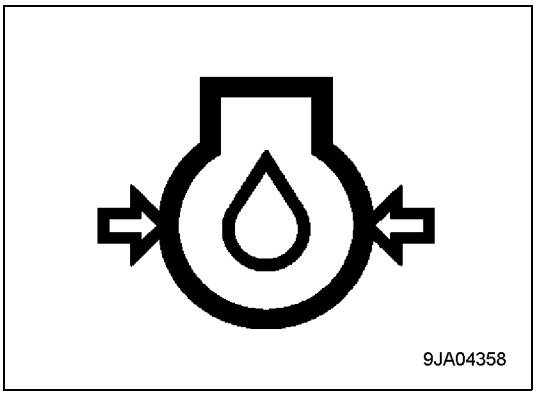
During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.



ENGINE OIL PRESSURE WARNING LAMP

Lamp (2) warns the operator that the engine oil pressure has dropped below the specified set value. During operation (engine running) if the engine oil pressure drops, the engine oil pressure warning lamp as well as the central warning lamp should light up and the alarm buzzer will sound intermittently. If the engine oil pressure lamp should come on shut the engine down immediately.

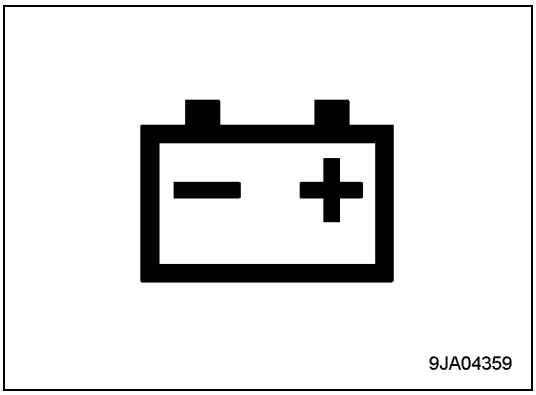
During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.



BATTERY CHARGE WARNING LAMP

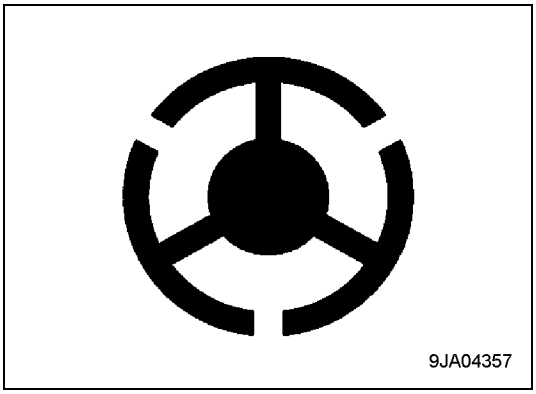
Lamp (3) warns the operator that the charging system has dropped below the specified set value. During operation (engine running) if the charging system should fail, the battery charge warning lamp as well as the central warning lamp should light up and the alarm buzzer will sound intermittently.

During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.



STEERING OIL PRESSURE WARNING LAMP

Red lamp (4) warns the operator that the steering oil pressure has dropped below the specified set value. During operation (engine running) if the steering oil pressure should drop, the steering oil pressure warning lamp as well as the central warning lamp should light up and the alarm buzzer will sound. At this point stop the machine immediately and do not operate it until repairs have been made. During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.

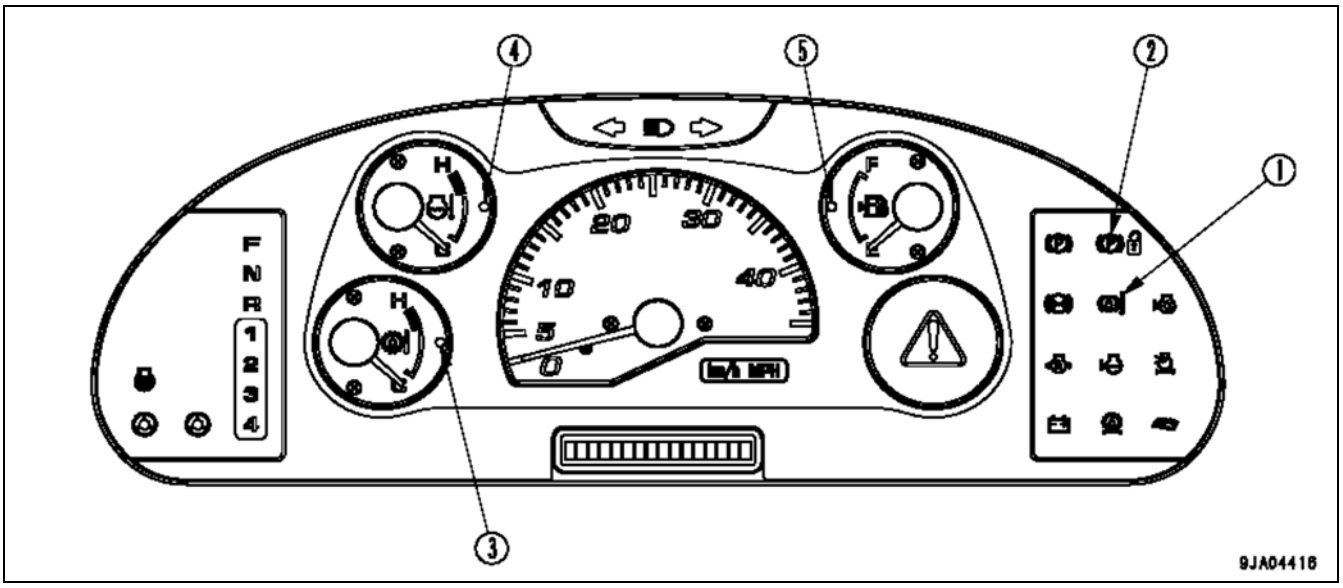


WARNING

If any steering warnings should occur, do not operate the machine until diagnostics or repairs have been made to this system. Operating the machine with a steering alert or warning could lead to loss of control on the machine.

CAUTION LAMPS

If an operator alert is required the (Caution Lamps), and an audible alarm will sound intermittently. The lamp for the location of the alert as well as the central warning lamp will light up. If any of these lamps are illuminated during operation of the machine, stop the machine in a safe location, lower the work equipment, set the parking brake and run the engine at a low idle until the light goes out or check the system showing the problem. Contact your **Komatsu** Dealer.

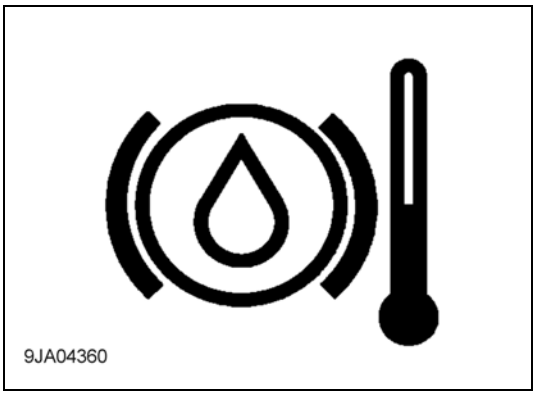


1. Axle Oil Temperature Caution Lamp	2. Parking Brake Reminder Lamp
3. HST Oil Temperature Caution Lamp	4. Engine Coolant Temperature Caution Lamp
5. Fuel Level Caution Lamp	

AXLE OIL TEMPERATURE CAUTION LAMP

Lamp (1) alerts the operator that the axle oil temperature has risen above the specified set value. During operation if the axle oil temperature lamp, as well as the central warning lamp should light up and the alarm buzzer sounds, stop the machine until the system cools down. At that point the lamps should go out and the buzzer should stop.

During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.



PARKING BRAKE REMINDER LAMP

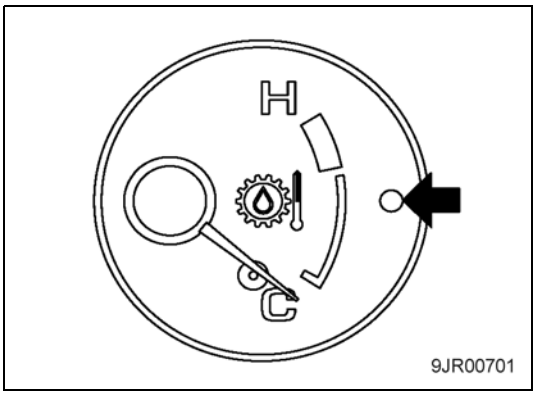
Lamp (2) alerts the operator if the parking brake is not set and the engine is off. During operation if the if the engine is shut down and the parking brake is not set the parking brake reminder lamp, as well as the central warning lamp should light up along with the alarm buzzer.

During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.

HST OIL TEMPERATURE CAUTION LAMP

Lamp (3) alerts the operator that the HST oil temperature has risen above the specified set value. During operation if the HST oil temperature lamp, as well as the central warning lamp should light up and the alarm buzzer sounds, stop the machine until the system cools down. At that point the lamps should go out and the buzzer should stop.

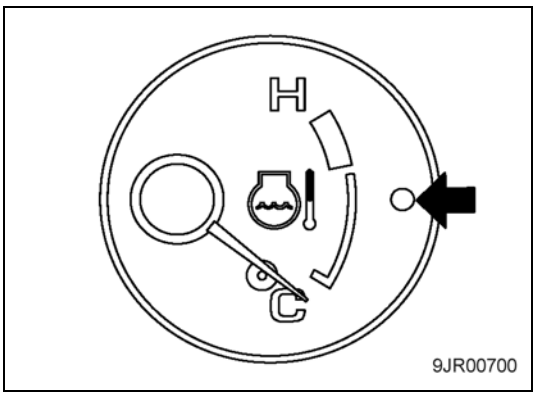
During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps will not be illuminated.



COOLANT TEMPERATURE CAUTION LAMP

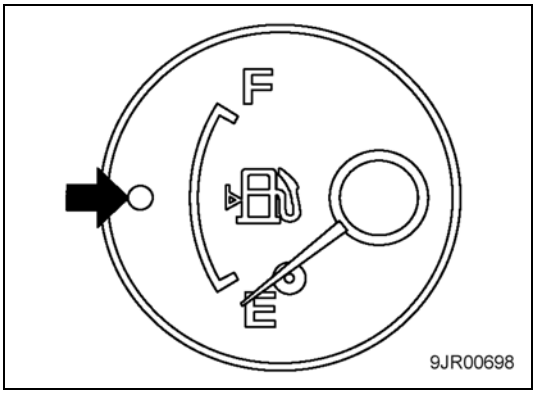
Lamp (4) alerts the operator that the engine coolant temperature has risen above the specified set value. During operation if the engine coolant temperature lamp, as well as the central warning lamp should light up and the alarm buzzer sounds, shut the engine down until the engine cools down. At that point the lamps should go out and the buzzer should stop once engine is started back up.

During checks before starting (ignition switch in the “ON” position, engine stopped) the lamps should be illuminated, and when the engine is running, these lamps should go out.



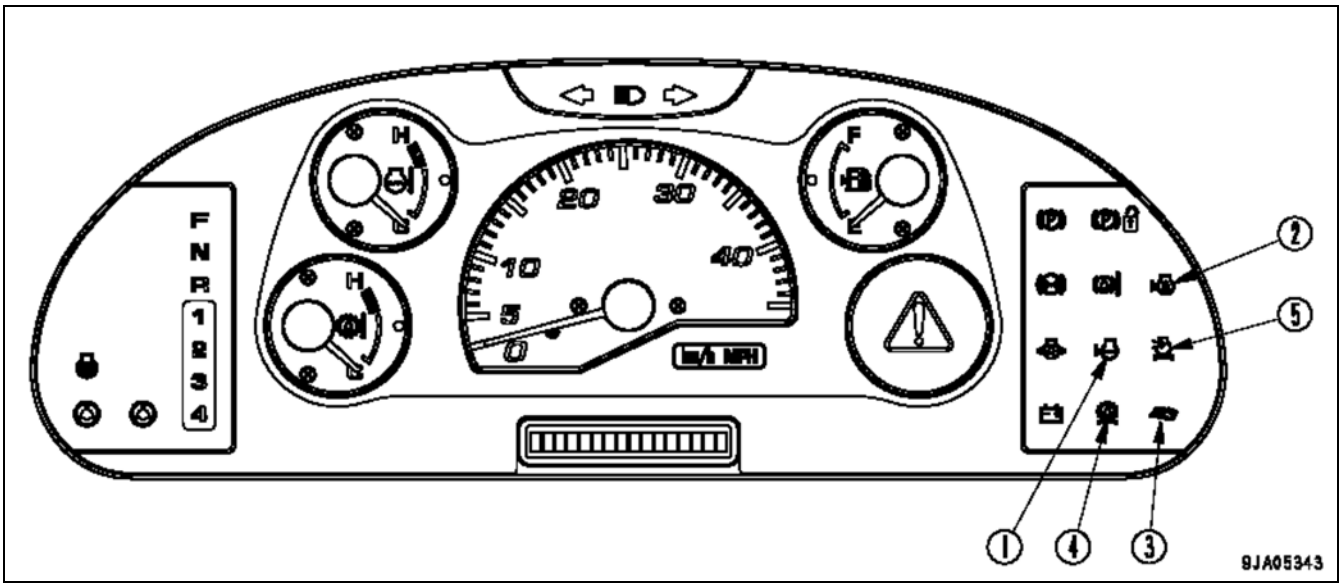
FUEL LEVEL CAUTION LAMP

Lamp (5) alerts the operator that the fuel in the tank is below 31 liters (8.19 gal). Add fuel as soon as possible.



INSPECTION AND MAINTENANCE ALLERTS

If there is need for service or inspection, the lamp for the location needing an inspection or service will light up. If any of these lamps are illuminated during operation of the machine, take the machine to a service location immediately, lower the work equipment, set the parking brake and shut the engine down. These items must be attended to immediately. Failure to do so may result in a system break down. Contact your local **Komatsu** Dealer for service on these items. Do not continue machine operations.

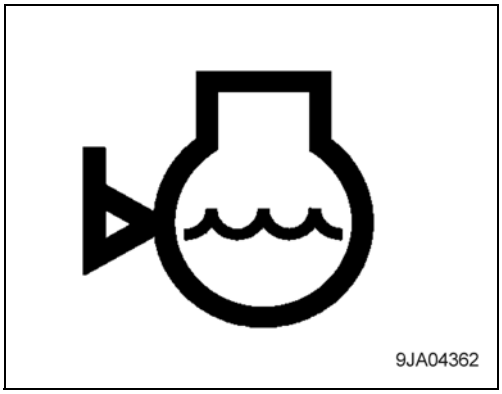


1. Radiator Coolant Level Alert Lamp	2. Engine Oil Level Alert Lamp
3. Maintenance Alert Lamp	4. HST Oil Filter Clog Alert Lamp
5. Air Cleaner Clogging Alert Lamp	

RADIATOR COOLANT LEVEL ALERT LAMP

Lamp (1) alerts the operator that the radiator coolant level is low and needs immediate attention. During operation if the radiator coolant level lamp should come on do not continue to operate the machine take the machine to a service location and have it serviced immediately.

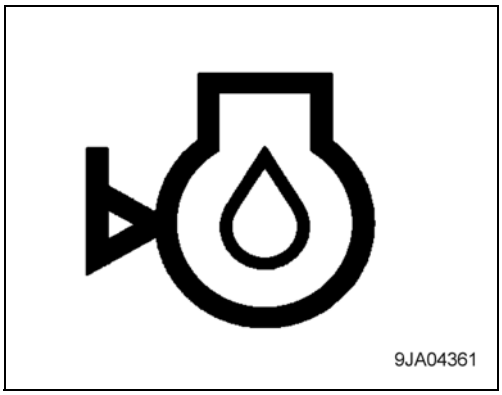
During checks before starting (ignition switch in the “ON” position, engine stopped) the lamp will only light when the coolant level is low.



ENGINE OIL LEVEL ALERT LAMP

Lamp (2) alerts the operator that the engine oil level is low and needs immediate attention. During operation if the engine oil level lamp should come on shut the machine down immediately and have it serviced.

During checks before starting (ignition switch in the “ON” position, engine stopped) the lamp will only light when the oil level is low.

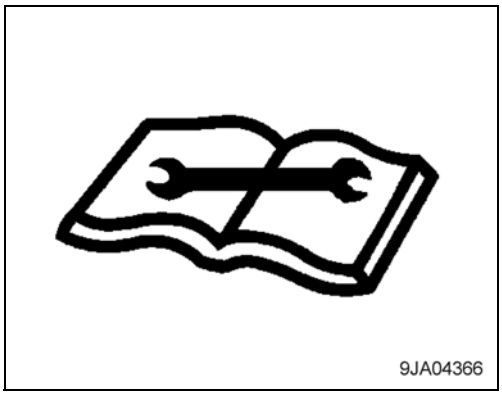


MAINTENANCE ALERT LAMP

Lamp (3) alerts the operator that it is time for an oil change on the machine, this lamp flashes or lights for approximately 30 seconds after the completion of the system check when the ignition key is turned to the “ON” position.

Remark

The maintenance alert lamp flashes when there is less than 30 hours left to the replacement time and after the replacement time period has passed.



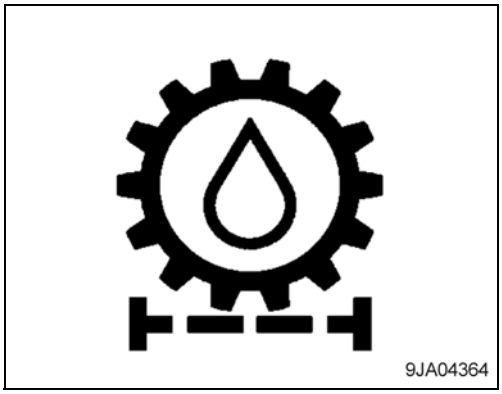
HST OIL FILTER CLOG ALERT LAMP

Lamp (4) alerts the operator that the HST oil filter is clogged and needs immediate attention. During operation if the HST filter clog alert lamp should come on do not continue to operate the machine take the machine to a service location and have it serviced immediately.

During checks before starting (ignition switch in the “ON” position, engine stopped) this lamp does not light up.

Remark

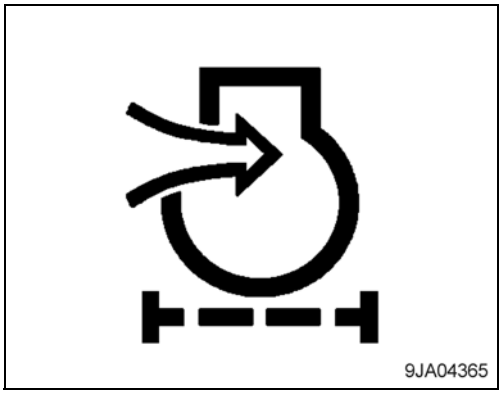
The lamp may light up in cold temperatures, but should go out when HST oil temperatures come up to the operating temperature range.



AIR CLEANER CLOGGING ALERT LAMP

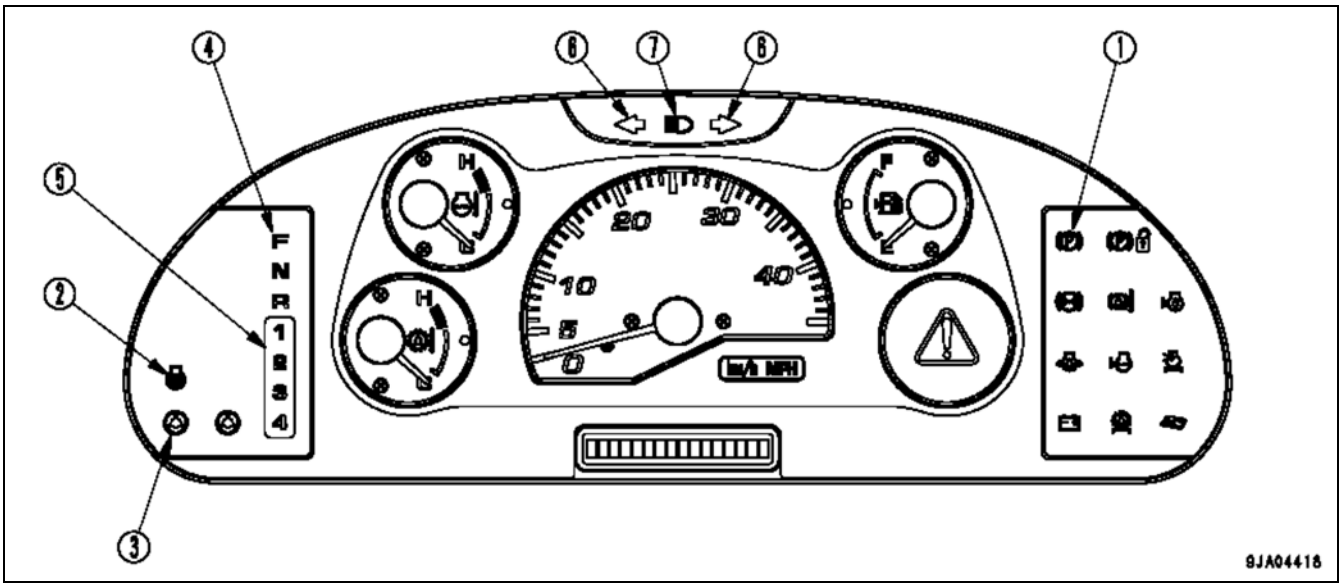
Lamp (5) alerts the operator that the air cleaner is clogged and needs immediate attention. During operation if the air cleaner clog alert lamp should come on do not continue to operate the machine take the machine to a service location and have it serviced immediately.

During checks before starting (ignition switch in the “ON” position, engine stopped) this lamp does not light up.



MODE ALERT LAMPS

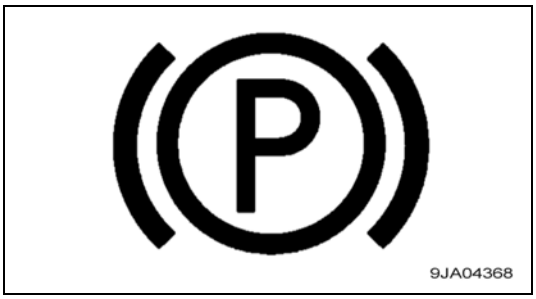
These indicators alert the operator that the machine is in a certain operating mode or a function is operating. It is important for the operator of this machine to pay close attention to these indications especially when the machines engine is running or the machine is mobile, failure to do so may shorten the life of a component or inadvertently cause an accident.



1. Parking Brake Indicator Lamp	2. Engine Preheat Lamp
3. Steering Oil Pressure Lamp (Green)	4. Direction Indicator Lamp
5. Speed Range Lamp	6. Turn Signal Indicator Lamp
7. Head Lamp Beam Indicator	

PARKING BRAKE INDICATOR LAMP

This lamp (1) will illuminate when the parking brake is set.



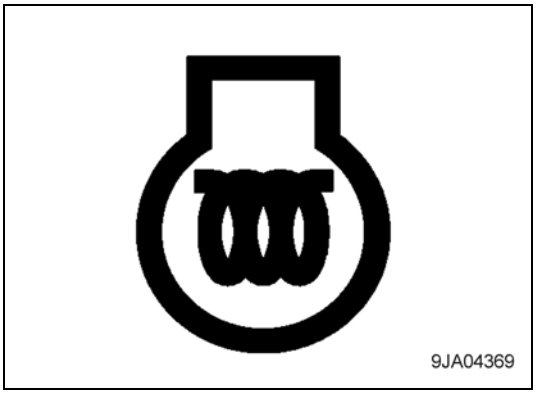
ENGINE PREHEAT LAMP

Lamp (2) lights when the engine is in the preheat mode during cold weather start ups. The preheat system is on a timer and will turn off once the desired temperature for the engine is reached.

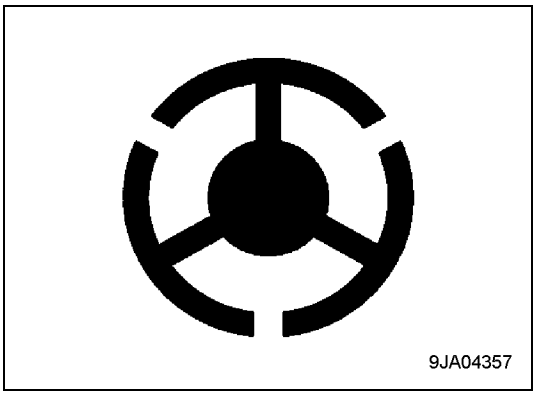
.

WARNING

Do not use starting ether on this engine, damage or explosion may result.



STEERING OIL PRESSURE LAMP (GREEN)

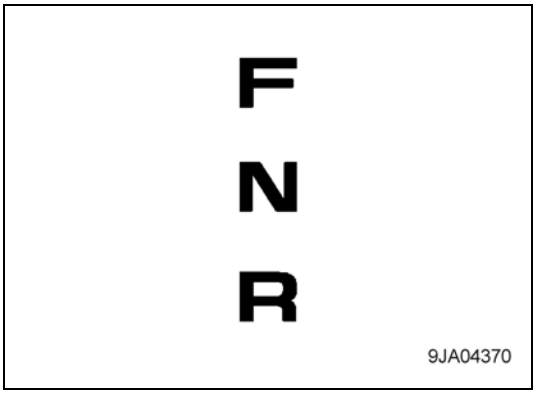


Emergency steering device (if equipped)

If this lamp (3) lights up when the engine is running or when the machine is operating, it indicates that the condition is normal.

If it does not light up when the machine is started, a problem in the emergency steering circuit has occurred. Move the machine immediately to a safe place, stop the engine, lower then work equipment and check the system.

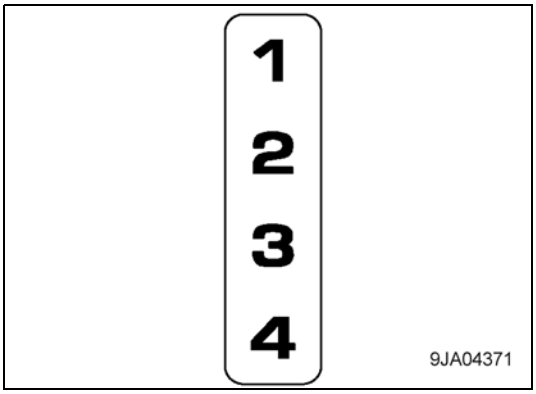
DIRECTION INDICATOR LAMP



This lamp (4) indicates the position of the directional lever.

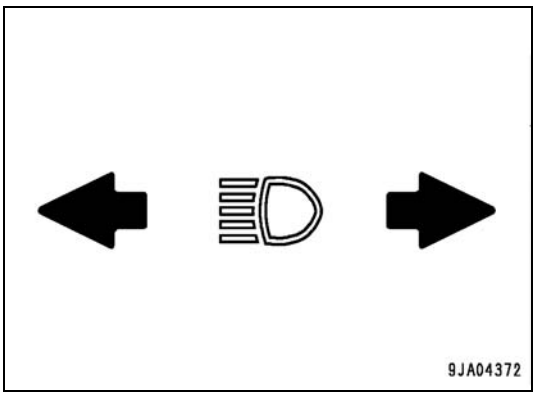
F lights up: **FORWARD**
N lights up: **NEUTRAL**
R lights up: **REVERSE**

DIRECTION INDICATOR LAMP



This lamp (5) indicates the position of the speed range selector switch.

TURN SIGNAL INDICATOR LAMP



When the turn signal lamp flashes, this lamp (6) also flashes.

Remark

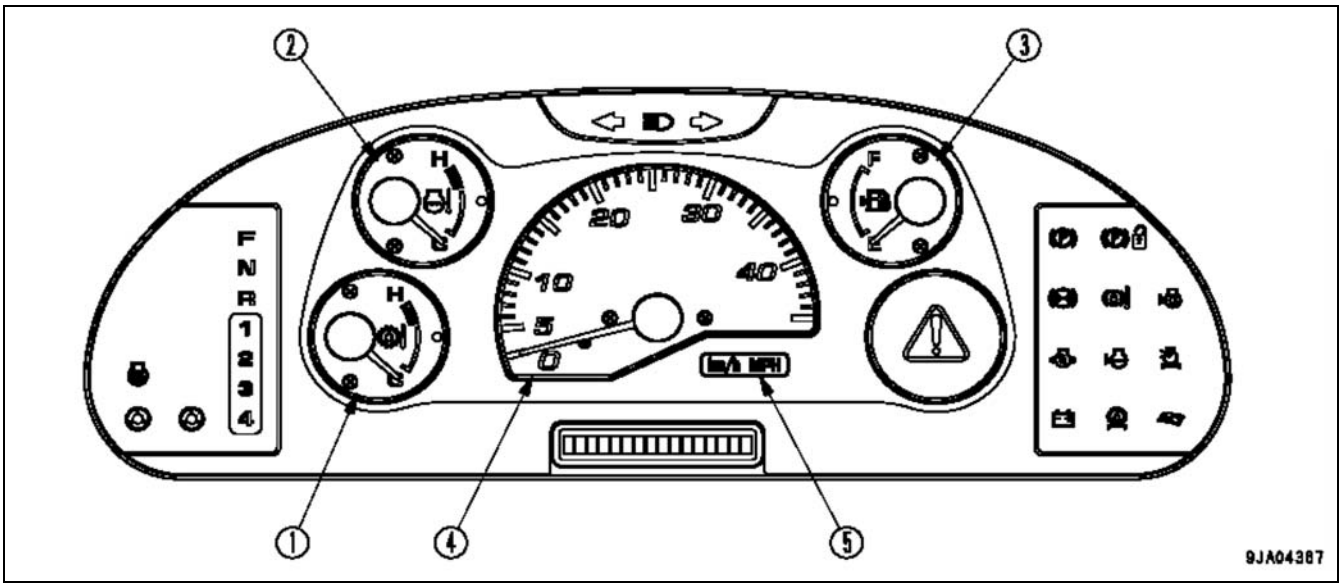
If there is an open in the turn signal circuit, the flashing interval becomes shorter.

HEAD LAMP BEAM INDICATOR

Located between the turn indicator arrows lamp (7) lights up when the high beam is activated.

GAUGE DISPLAY

These gauges allow the operator of the machine the ability to monitor the operating systems on the machine. It is important for the operator to pay close attention to these gauges especially when the machines engine is running, mobile or the working.

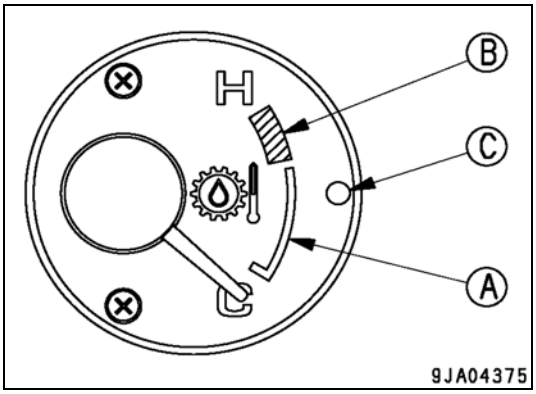


1. HST Oil Temperature Gauge	2. Engine Coolant Temperature Gauge
3. Fuel Level Gauge	4. Speedometer
5. Meter Mode Display	

HST OIL TEMPERATURE GAUGE

Meter (1) indicates the HST oil temperature. During normal operations, the indicator should be in the white range (A). If the indicator enters red range (B) during operations, caution lamp (C) on the HST oil temperature gauge lights up. At the same time, the central warning lamp lights and the alarm buzzer sounds.

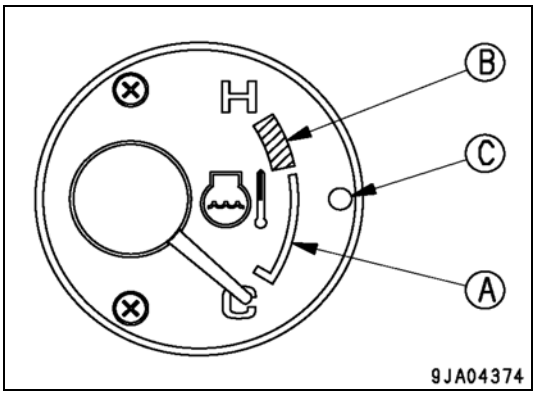
If the gauge indicates in the red range (B) run the engine at a midrange speed under no load and wait for the indicator to return to the white range (A).



ENGINE COOLANT TEMPERATURE GAUGE

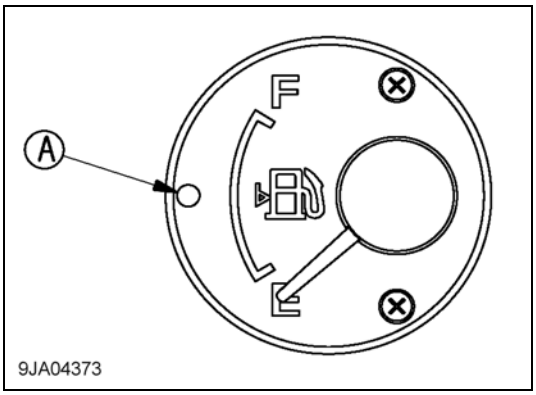
This meter (2) indicates the engine coolant temperature. During normal operations, the indicator should be in the white range (A). If the indicator enters red range (B) during operations, caution lamp (C) on the engine coolant temperature gauge lights up. At the same time, the central warning lamp lights up and the alarm buzzer sounds.

If the gauge indicates in the red range (B) run the engine at a midrange speed under no load and wait for the indicator to return to the white range (A).



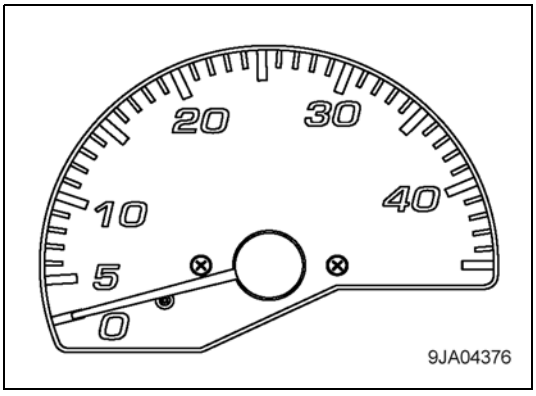
FUEL LEVEL GAUGE

Meter (3) indicates the amount of fuel remaining in the fuel tank. If the indicator is in the **F** position, it indicates that the tank is full. If the indicator is in the **E** position, it indicates that there is little fuel remaining. When the amount of remaining fuel goes below 31 liters (8.19 gal), caution lamp (A) on the fuel gauge lights up. If it lights up, add fuel immediately.



SPEEDOMETER

Meter (4) indicates the travel speed of the machine.

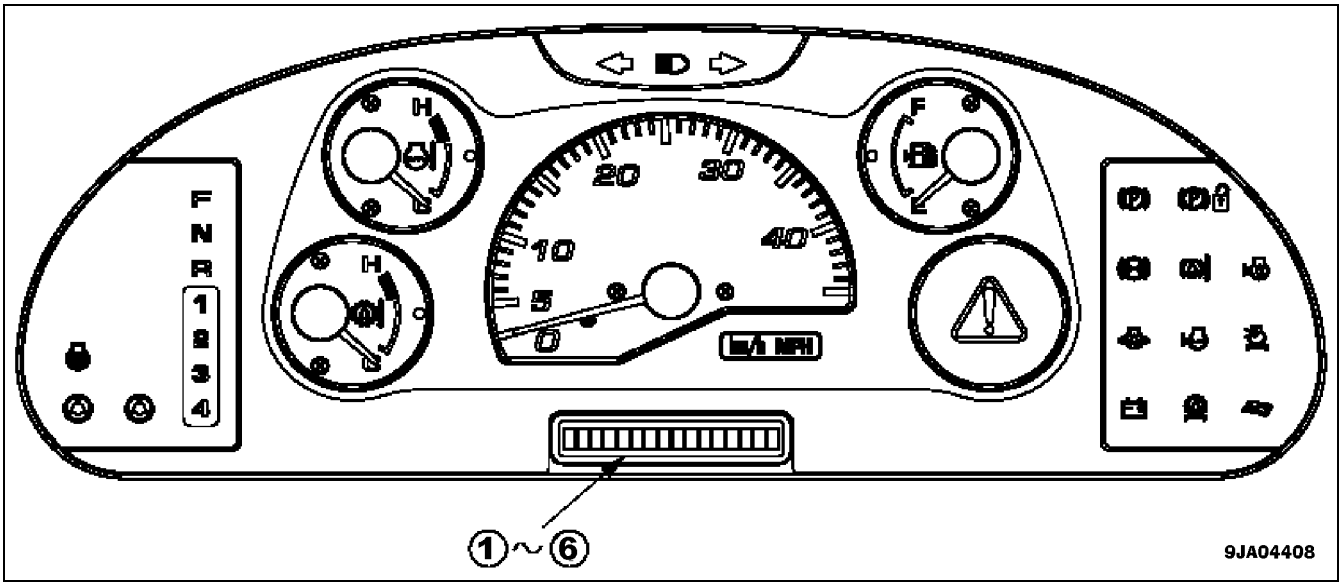


METER MODE DISPLAY

Lamp (5) displays the unit for the travel speed.

MACHINE ELECTRONIC MONITORING DISPLAY

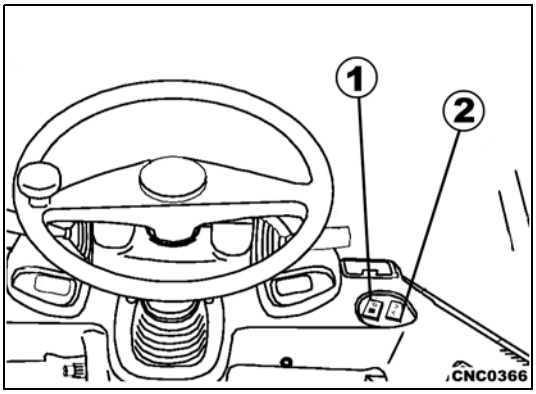
This display system electronically monitors several major functions, these functions include the amount of operating hours on the machine, all operating alert and failure information and service intervals. These functions can be accessed by using the mode selector switches (1) and (2). It is important for the operator of this machine to know how to access this information and understand what this information contains.



1. Hour Meter And Odometer Display	2. Action Code Display
3. Failure Code Display	4. Service Display
5. Selecting Language	6. Setting HST Function

MONITOR MODE SELECTOR SWITCHES

In order to access information on the monitor, the mode selector switches must be used in conjunction with each other. These switches are located on the right hand side of the instrument panel as shown in the illustration. They allow you to enter or exit a mode as well as navigate within the mode. There operating function is listed below:



MODE SELECTOR SWITCH 1

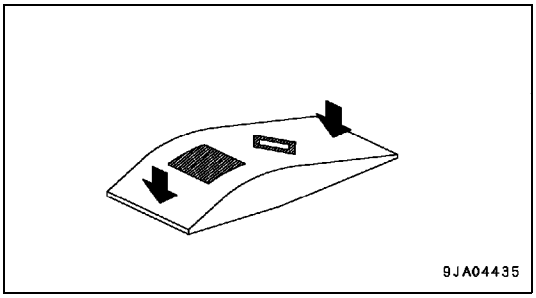
Mode selector switch (1) is used to switch the function of the character display on the monitor screen. The basic operation is as follows.

Position: ◇

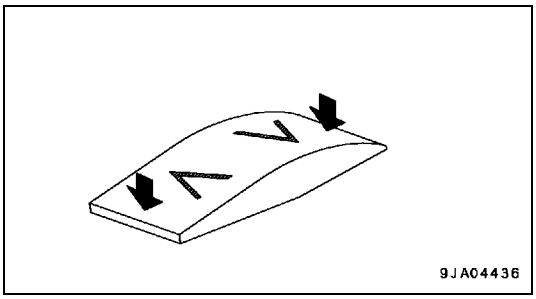
To select, confirm or enter a mode or operation.

Position: ■

To exit or cancel mode or operation.



MODE SELECTOR SWITCH 2



Mode selector switch (2) is used to navigate within the chosen display on the monitor screen. The basic operation is as follows.

Position: >

To go on to the next screen or function, move the cursor forward, or to increase the number when entering numerals

Position: <

To go back to the previous screen or function, or to move the cursor back, or to reduce the number when entering numerals

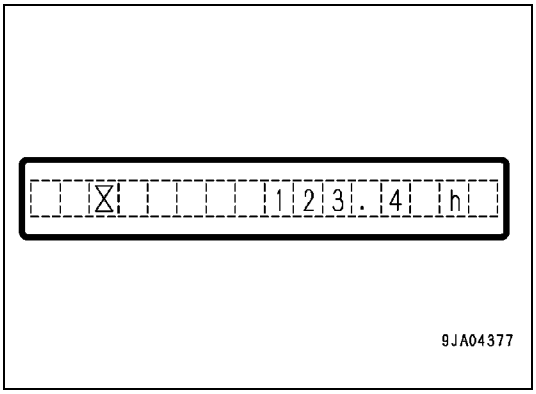
MONITOR DISPLAY INFORMATION

Once you know the operating functions of the mode selector switches (1) and (2) it is important to be able to access this information and navigate within the mode you have selected, below is a list of these mode and how to access and navigate within them.

HOUR METER AND ODOMETER DISPLAY

An hour meter reading or an odometer reading can be displayed in this mode if desired.

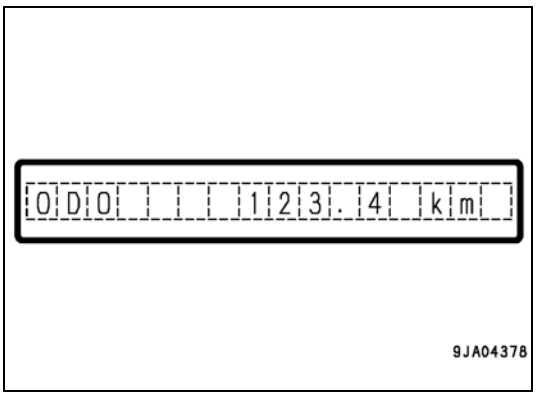
Hour Meter Display



During normal operation display (1) shows the total time in hours that the machine has been operating. While the engine is running, the hour meter advances even if the machine is not moving. The hour meter advances by 1 hour of operation, regardless of the engine speed.

You can also access the hours on the machine with the ignition switch in the OFF position simply by pressing the. ◇button.

Odometer Display



To check the total distance that the machine has traveled or to simply use the odometer feature while traveling:

With the ignition switch in the ON position or the machine running.

Press the ◇ button and the display will change from the hour meter display to the odometer display. The display will remain in the odometer mode until the ignition switch is turned to the “OFF” position or the ■ is pressed.

ADJUSTING MONITOR BRIGHTNESS

To adjust monitor display. See “ADJUSTING MONITOR BRIGHTNESS” on page (5-24)

PROGRAMING TELEPHONE NUMBER

To program in phone numbers. See “PROGRAMING TELEPHONE NUMBERS” on page (5-23)

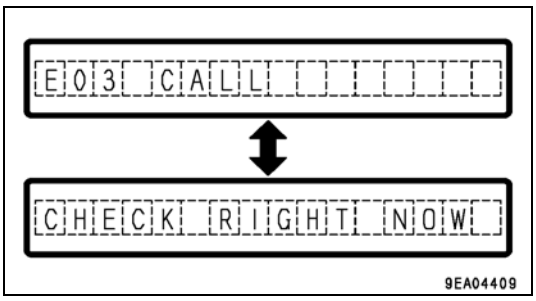
ACTION CODE DISPLAY

If an inspection or maintenance procedure must be performed, if there is a failure on the machine, or if it should become necessary to change your operating methods, An action code **E00**, **E01**, **E02**, or **E03** will be displayed on the monitor display portion (3). If different failures should occur at the same time, the action code for the most serious problem is displayed. The action code will be displayed first, then the system with the failure will be displayed at 3 second intervals.

The level of seriousness in the action code order is as follows, starting with the most serious: E03, E02, E01, E00. In the case of action codes E00, E02, and E03, the alarm buzzer sounds intermittently and the central warning lamp lights up.

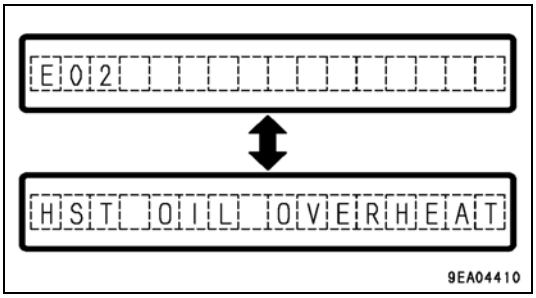
Action Code (E03)

This code is the most serious of all the codes, it usually indicates an oil pressure loss or a malfunction in a safety related system. If this code should appear on the monitor, stop and shut the machine down immediately. Contact your **Komatsu** Dealer and do not operate the machine until the problem is repaired.



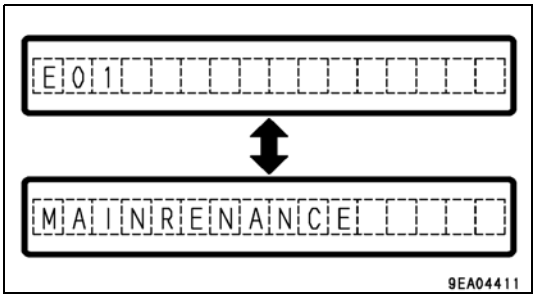
Action Code (E02)

This code warns the operator of a potential failure if action is not taken immediately. This would be an over heat condition or an engine over speed. If this code should appear while operating the machine, stop the machine and allow the system to cool down or slow the machine down to a safe controllable speed.



Action Code (E01)

This code alerts the operator of a problem in the system. This would be low coolant level or a maintenance due item. If this code should appear while operating the machine, take the machine to a maintenance area so servicing can be carried out or the problem can be checked.

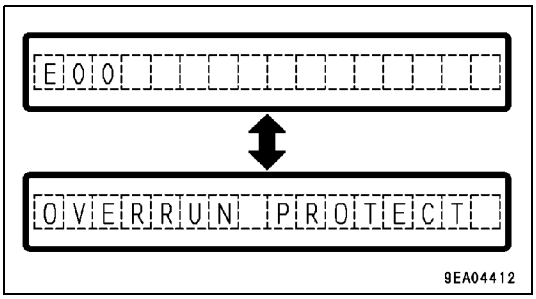


Action Code (E00)

This code will appear if the machine is traveling at an excessive road speed or down hill at an excessive speed. In either case the machines engine is running in an over speed condition. If this should occur, slow the machine down immediately to a safe speed. Never over speed the engine, damage to the engine will occur.

Remark

Action codes cannot be erased or canceled, after repairs have been made the system will automatically reset its self and the code will disappear.

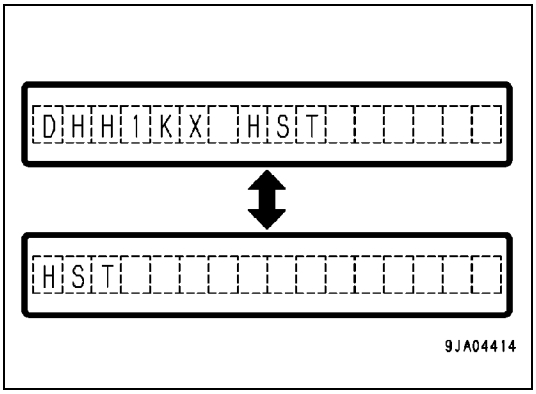


FAILURE CODE DISPLAY

If an action code is displayed, check the failure code using the failure code display method given below.When contacting your **Komatsu** distributor to request repairs, please inform your distributor of the failure code.

Method Of Displaying Failure Code

If an action code is displayed on the monitor display portion (4), press the mode selector switch > button.



1. The action code will change to the failure code.

   - The failure code is displayed with the first 6 digits on the left side of the character display.
   - The code displayed after the space on the right side of the failure code indicates the controller that detected the failure code.
   - The failure code and the component causing the failure are displayed on the character display for 3 seconds each.

The controller in the system detecting the failure will be indicated. →

Top right code	Controller detecting failure code
MON	Machine monitor
HST	Hydro Static Transmission

Press the selector switch > button again. If the condition is normal, the service meter is displayed for several seconds, then the display returns to the action code. If more than one failure has occurred at the same time, the next failure code is displayed.

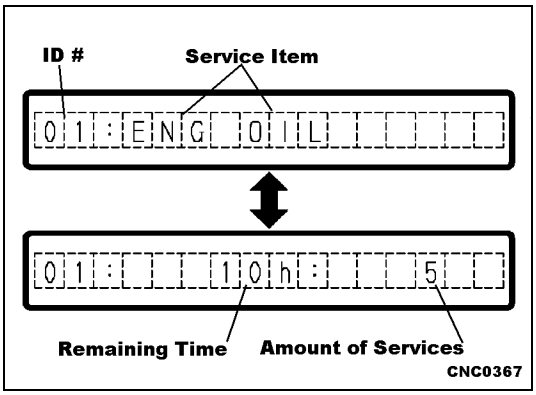
SERVICE DISPLAY

After a complete system check when the ignition switch is turned to the “ON” position, if any filter or oil related item is approaching it’s replacement time, this display (5) shows the item for approx. 30 seconds. When this happens, the maintenance caution lamp also flashes or lights up. If this should occur during operation of the machine, have the maintenance performed as soon as possible. After replacing the filter or changing the oil, it is important to reset the time for replacement.

Service Items List

Item	Service Interval (hrs.)	System Needing Service	System ID Number
Engine oil	500	ENG OIL	01
Engine oil filter	500	ENG FILT	02
Fuel filter	500	FUEL FILT	03
Transfer oil	1000	TRANSF OIL	25
HST oil filter	1000	HST FILT	26
Hydraulic filter	2000	HYD FILT	04
Hydraulic oil	2000	HYD OIL	10
Axle oil	2000	AXLE OIL	15

Service Alert Display



The ID number and item name needing service are displayed on the monitor display, the remaining time to service the item and the number of times a service has been performed are displayed in 3 second intervals. If the service time has already passed, a minus (-) sign appears before the time display. After the display has been on for 30 seconds, it does not appear again until the ignition switch is turned to the ON position again.

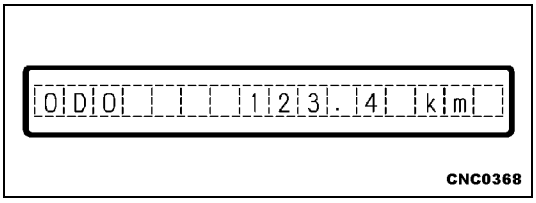
The service information in the illustration is not shown on the monitor display if an action code is being displayed.

If there are two or more items to be displayed, they are displayed in a simultaneous order. If there are more than 10 items, all the items are displayed in a simultaneous order also, then the display will return to it's normal display. The display appears when there is 30 hours remaining on the service items time. If the replacement time has passed, a minus (-) sign appears before the time for the first 999 hours. When more than 999 hours have passed, a display is no longer given. The maintenance caution lamp flashes as the replacement time approaches, and after the replacement time has passed.

Resetting Service Times After Servicing

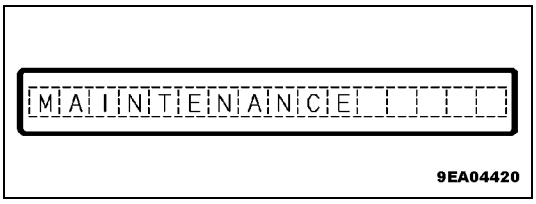
Once an item has been serviced and the machine is ready to go back into operation it is necessary to reset the service time interval. It is important to do this in order to keep track of when it will be time to perform service on the machine again. Below is the procedure for resetting the service time interval.

1. To enter reset mode the ignition key must be in the ON position.



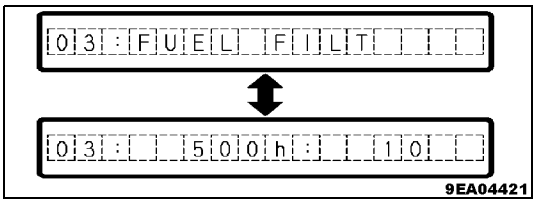
2. Press the ◇ selector switch button and it will display the odometer.

3. Using the > selector switch button scroll thought the menu to the **[MAINTENANCE]** display.

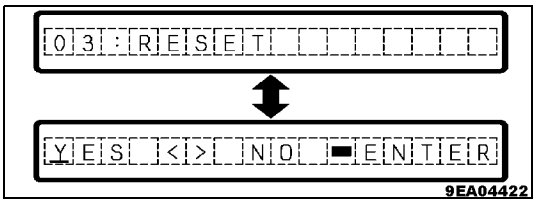


4. Once the **[MAINTENANCE]** display is reached, press the ◇ selector switch button to enter the system.

5. Once in the system using the < > selector switch buttons you can scroll through the eight service items listed on page 2-24.



6. When you have found the item that was serviced, using the ◇ selector button switch reset the service time interval, a **[00: RESET]** will appear on the monitor display. 3 seconds later a **[YES <> NO ■ ENTER]** will appear.



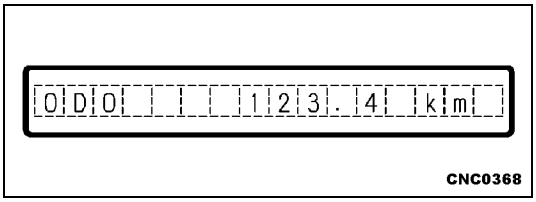
7. To reset the service interval, select **YES** or **NO** using the < > selector switch buttons. Once you have chosen yes or no, use the ◇ selector button to reset the maintenance time interval If yes is selected the service time interval is reset and a beep is heard. If no is selected the service time is not reset.

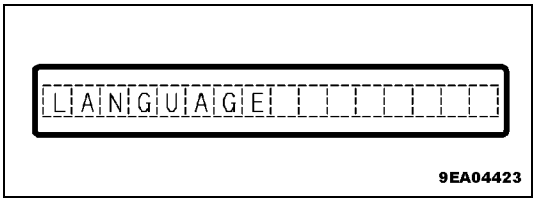
SELECTING LANGUAGE

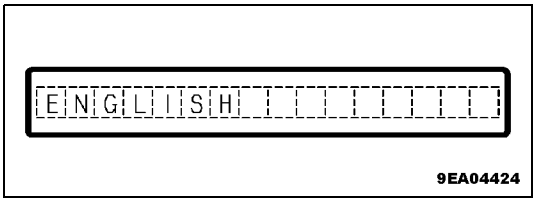
To switch the language on the mode display. The following explanation outlines the procedure for changing the language to either English, Japanese, German, French, Italian, Spanish or Swedish.

To Select A Language

1. To enter reset language mode the ignition key must be in the ON position.
2. Press the ◇ selector switch button and it will display the odometer.
3. Using the > selector switch button scroll through the menu to the **[LANGUAGE]** display.
4. Once the **[LANGUAGE]** display is reached, press the ◇ selector switch button to enter the system. The current language is displayed.
5. Once in the system using the < > selector switch buttons you can scroll through the seven languages.
6. After selecting a language, press the ◇ selector switch button. This confirms the language. To abort, press the ■ selector switch button. When completing the operation, press the ■ selector switch button twice or turn the ignition switch OFF.





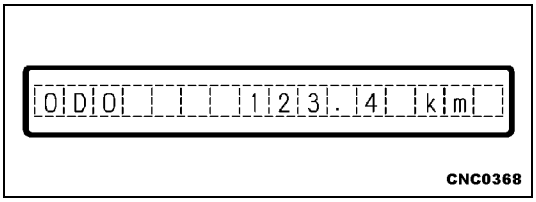


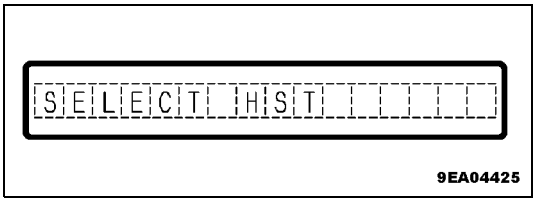
SETTING HST FUNCTION

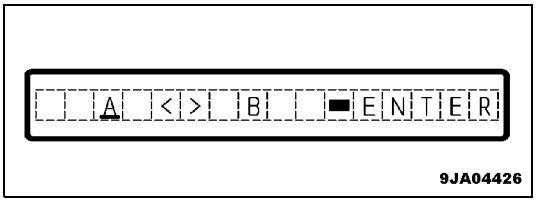
This feature is allows you to limit the speed range in reverse when operating in high 3rd or 4th gear speed ranges.

Function	Speed range selector switch position going forward to reverse	
	3rd speed range	4th speed range
(A) mode (default)	F3, R3	F4, R4
(B) mode (limits speeds in reverse)	F3, R2	F4, R2

1. To enter reset HST mode the ignition key must be in the ON position.
2. Press the ◇ selector switch button and it will display the odometer.
3. Using the > selector switch button scroll thought the menu to the **[SELECT HST]** display.
4. Once the **[SELECT HST]** display is reached, press the ◇ selector switch button to enter the system.
5. Once in the system using the < > selector switch buttons you can set the HST in the (A) or (B) mode.
6. After selecting the mode using the ■ selector switch button confirm the setting.When completing the operation, press the ■ selector switch button twice or turn the ignition switch OFF.

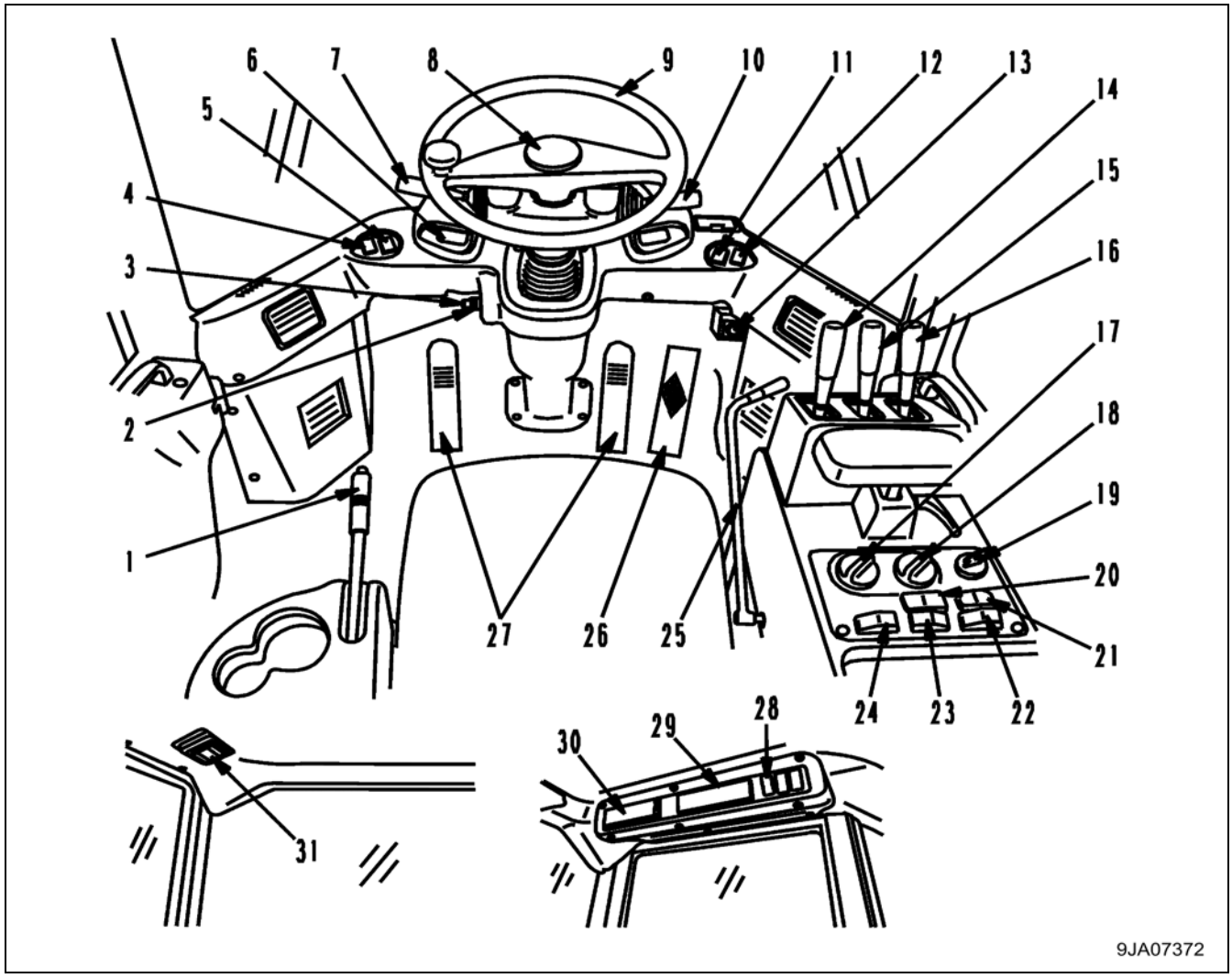






MACHINE SWITCHES AND CONTROLS

Before operating the machine it is also important to understand all the functions of your machines controls and switches. Operating the machine without full knowledge of all control systems may damage the machine, property or possibly cause injury to the operator. Below is a description of all switch and controls functions

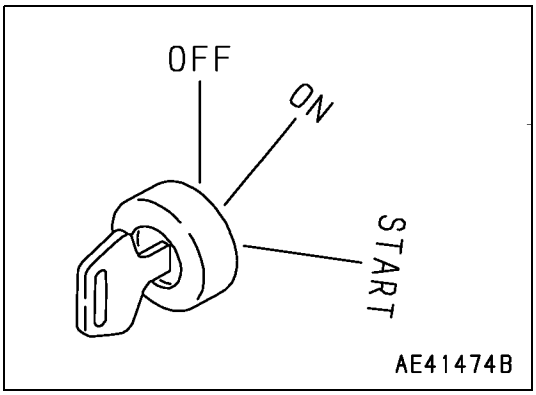


1. Parking Brake Lever
2. Rear Wiper Switch
3. Front Wiper Switch
4. Front Work Lamp Switch
5. Rear Work Lamp Switch
6. Hazard Lamp Switch
7. Directional Control Lever
8. Horn Button
9. Steering Wheel
10. Head Lamp/Turn Signal/Dimmer Switch
11. Mode Select Switch 1
12. Mode Select Switch 2
13. Cigarette Lighter
14. Auxiliary Control Lever
15. Bucket Control Lever
16. Lift Arm Control Lever
17. Variable Shift Control Switch
18. Speed Range Selector Switch
19. Ignition Switch
20. E.C.S.S. Switch (if equipped)
21. Traction Control Switch
22. Attachment Select Switch
23. Dump Speed Switch
24. Quick Coupler Switch
25. Work Equipment Lock Lever
26. Accelerator Pedal
27. Brake Pedals
28. Rear Window Heater Switch
29. Air Conditioner Panel
30. Radio (if equipped)
31. Cab Lamp Switch

SWITCHES

Manual switch controlled systems are used to operate electrically operated features. Most of these features are not part of the controls in the main operating system. However, it is important that the operator know where they are located and how they operate.

IGNITION SWITCH



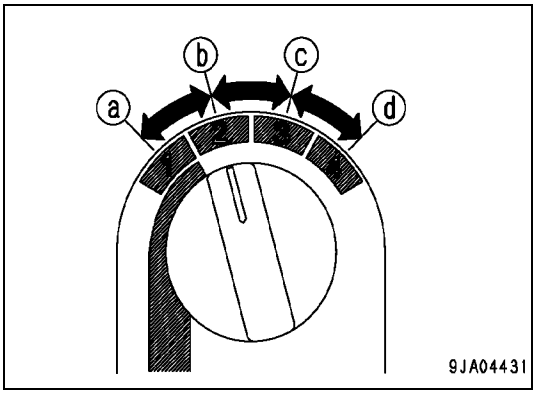
Switch (1) is used to start or stop the engine.

OFF position:
In this position, you can insert or remove the key. All the electrical systems are off, and the engine will stop.

ON position:
In this position, electrical current is now connected to the circuitry, and all accessory operate. Always keep the ignition switch in the “ON” position while operating the machine.

START position:
This position is used to start the engine. Hold the key in this position while cranking the engine. Release the key immediately after the engine has started. The key will return to the ON position when released.

SPEED RANGE SELECTOR SWITCH

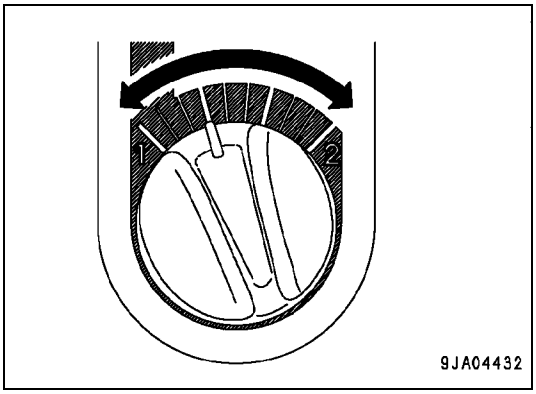


Switch (2) is used to select the speed ranges.

Use setting1st and 2nd for loader operations, and 3rd and 4th for travel.

Position (a): **1st**
Position (b): **2nd**
Position (c): **3rd**
Position (d): **4th**

VARIABLE SHIFT CONTROL SWITCH



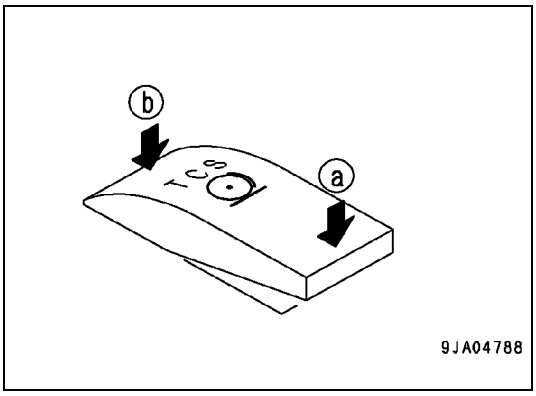
When the speed range is in 1st, it is possible to use this dial (3) to set the maximum speed as desired.

Turn the dial to the right to increase the setting; turn it to the left to decrease the setting.

Keep in mind conditions for use may differ according to the condition of the road surface.

Factory Tire Size	Max. Speed km/h (MPH)
Standard tire (20.2-25)	4.0 - 13.0 (2.5 - 8.1)

TRACTION CONTROL SWITCH



Switch (4) can be used to actuate the traction control and reduce the maximum rim pull.

Position (a): **ON**
Traction control is activated

Position (b): **OFF**
Traction control is deactivated

Remark

Traction control is effective in preventing the tires from slipping during light-duty operations.

ECSS SWITCH

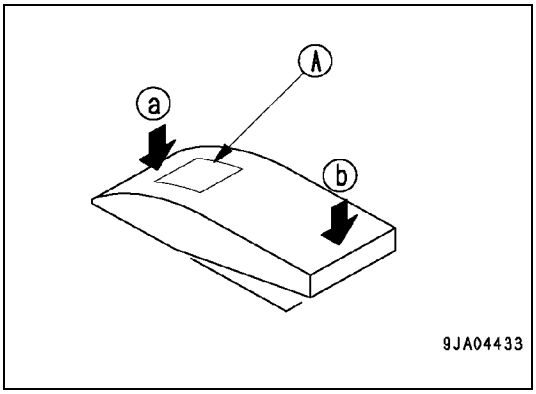
The ECSS. is a device that uses the hydraulic spring effect of an accumulator to absorb the vibrations of the chassis during travel. This allows the machine to travel smoothly and at high speed.

⚠ WARNING

- **If the machine is traveling with the work equipment raised, and the E.C.S.S. switch is suddenly turned ON, the work equipment will move.**
- **If operations are carried out and the E.C.S.S. switch in the ON position, changing the E.C.S.S. switch to the OFF position may cause the work equipment may move.**
- **Never turn the E.C.S.S. switch ON during inspections or maintenance. The work equipment will move and create a dangerous situation.**

Remark

Always stop the machine and lower the work equipment to the ground before using the ECSS system. When carrying out inspections and maintenance, first lower the work equipment to the ground, then turn the ECSS switch OFF before starting any of these inspections and maintenance procedures. When carrying out leveling operations, turn the E.C.S.S. switch OFF.



Switch (5) is used to turn the E.C.S.S. **ON** and **OFF**.

Position (a): **ON**
The pilot lamp (A) lights up and the E.C.S.S. is actuated.

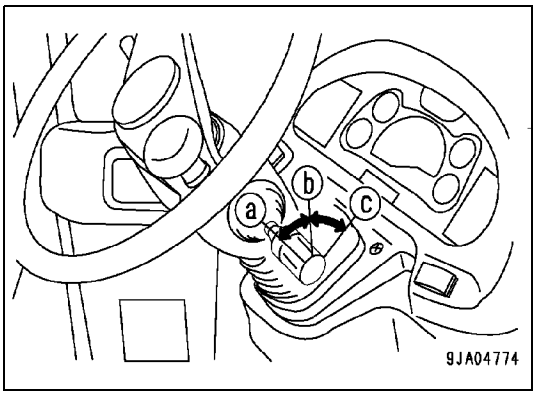
Position (b): **OFF**
The ECSS. is not actuated.

Remark

The travel damper is automatically actuated when the travel speed is higher than 6 km/h (3.7 MPH); when the travel speed drops below 5 km/h (3.1 MPH) it is automatically disengaged (when 20.5-25 tires are used).

HEAD LAMPS-TURN SIGNALS-DIMMER SWITCH

Head Lamps Switch



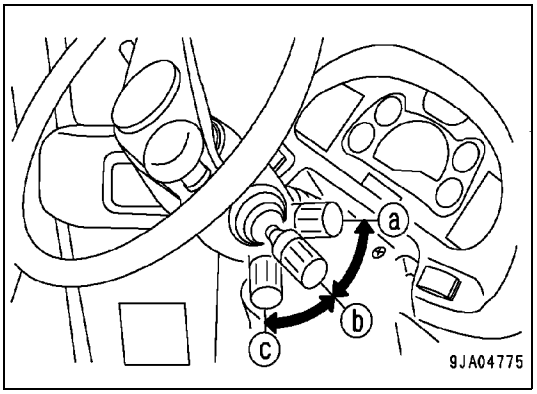
Switch (6) is used to light up the front head lamps, side clearance lamps, tail lamps, and instrument panel.

Position (a): **OFF** (Lamps go out)

Position (b): Side clearance lamps, tail lamps, and instrument panel light up

Position (c): Head lamps light up in addition to lamps at (position

Turn Signals Switch



Switch (6) is used to operate the turn signal lamp.

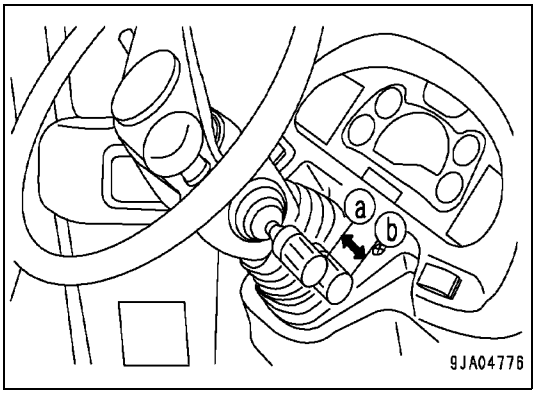
(a) position: **LEFT TURN** (Push lever forward.)

(b) position: **OFF**

(c) position: **RIGHT TURN** (Pull lever back.)

When the steering wheel is turned back, the lever automatically returns to its original position. If it does not return, return it manually.

Dimmer Switch

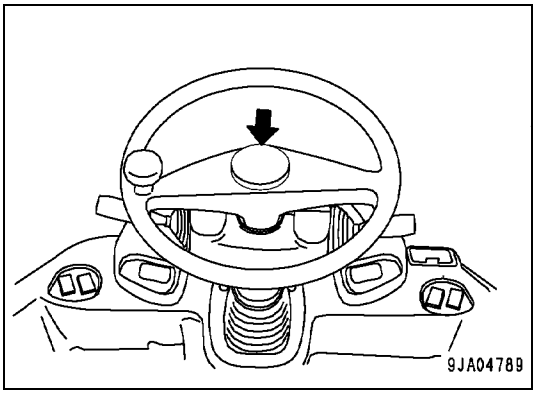


Switch (6) is used to switch the head lamps between high beam and low beam.

Position (a): **LOW BEAM**

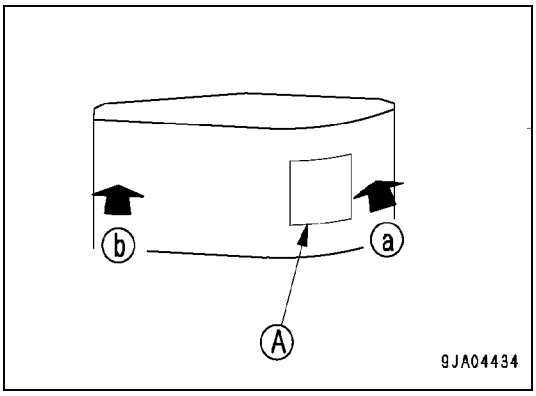
Position (b): **HIGH BEAM**

HORN BUTTON



When the horn button (7) in the center of the steering wheel is pressed, the horn will sound.

HAZARD LAMP SWITCH



Switch (8) is used in emergencies, when the machine breaks down or has to be parked on the road.

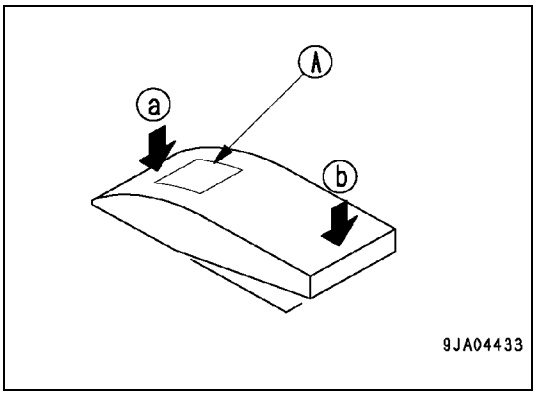
Position (a): Direction indicator lamp and directional indicator pilot lamp flash, and pilot lamp (A) lights up at the same time.

Position (b): Lamps go out

Remark

Use the hazard lamp only in emergencies. Using the hazard lamp when traveling may cause confusion for other machine operators.

FRONT WORK LAMPS SWITCH



Switch (9) is used to light up the front working lamp.

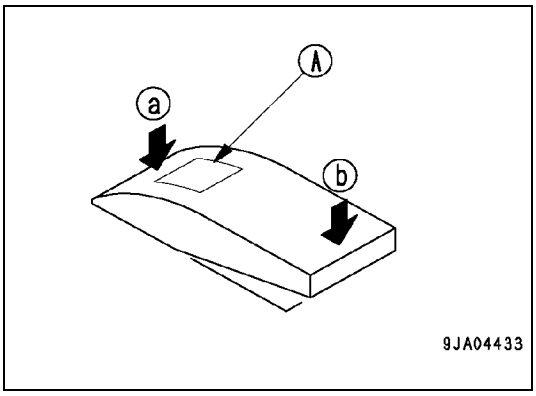
Position (a): Working lamp and pilot lamp (A) light up

Position (b): Working lamp goes out

Remark

If the lamp switch is not in the ON position for the side clearance lamp or head lamp, the working lamp will not light up. Always turn the working lamp off before traveling on public roads.

REAR WORK LAMPS SWITCH



Switch (10) is used to light up the rear working lamp.

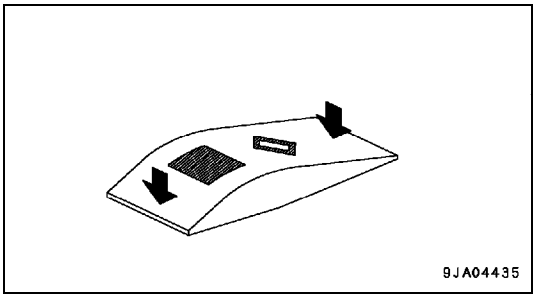
Position (a): Working lamp and pilot lamp (A) light up

Position (b): Working lamp goes out

Remark

If the lamp switch is not in the ON position for the side clearance lamp or head lamp, the working lamp will not light up. Always turn the working lamp off before traveling on public roads.

MODE SELECTOR SWITCH 1



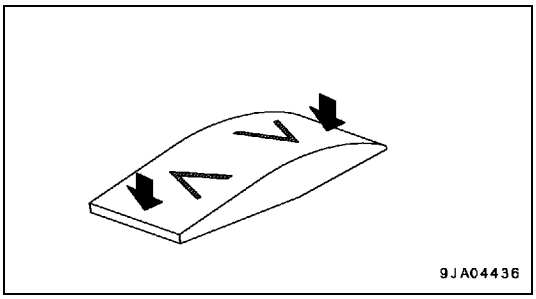
Switch (11) is used to switch the function of the character display.

See page 2-21 for details on this switch.

MODE SELECTOR SWITCH 2

Switch (12) is used to switch the function of the character display.

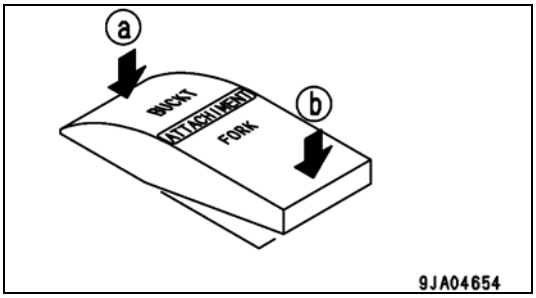
See page 2-22 for details on this switch.



ATTACHMENT SELECT SWITCH

This switch (18) switches the bucket positioner and fork positioner.

Position (a): When using the bucket, set to this position.
Position (b): When using the fork, set to this position.

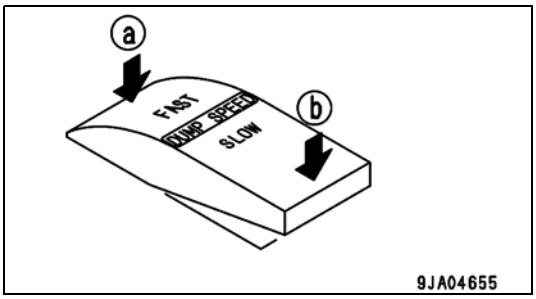


DUMP SPEED SWITCH

Use this switch (19) to select the bucket dump speed.

Position (a): High speed
Position (b): Low speed

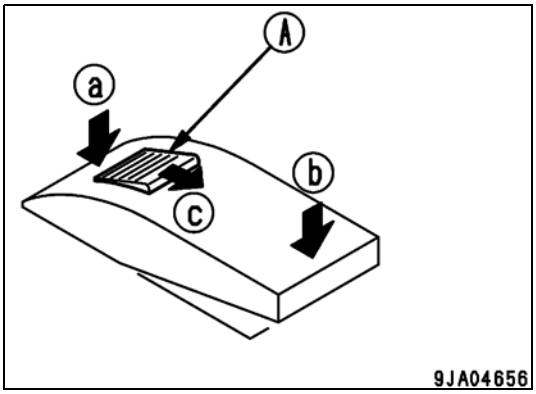
The bucket tilt speed is not affected by this switch.



QUICK COUPLER SWITCH

Use this switch (20) to connect and release the connection of the coupler and attachment when installing or removing the attachment.

Position (a): Release
Push the switch in to this position, then pull lock (A) in the direction of the arrow (c) and release the connection.
Position (b): Connect



FRONT WIPER SWITCH

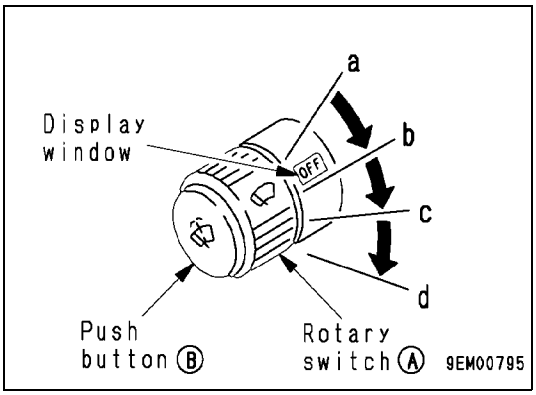
Switch (A) of switch (13) turns the front wiper on. If button (B) is pressed, washer fluid will be sprayed onto the front glass while the button is being pressed.

Position (a): (OFF) Stop

Position (b): (INT) Intermittent wiper

Position (c): Low-speed wiper

Position (d): High-speed wiper



REAR WIPER SWITCH

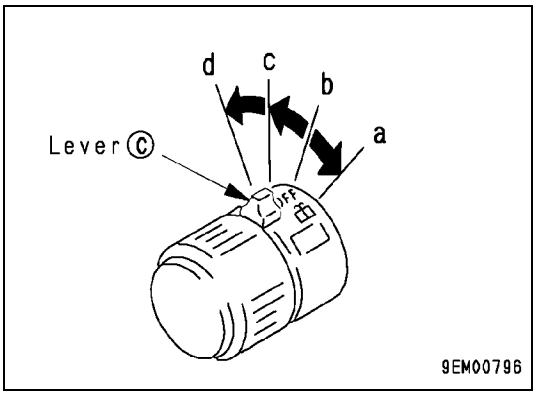
When lever (C) of this switch (14) is turned, the rear wiper will operate.

Position (a): Washer fluid is sprayed

Position (b): OFF

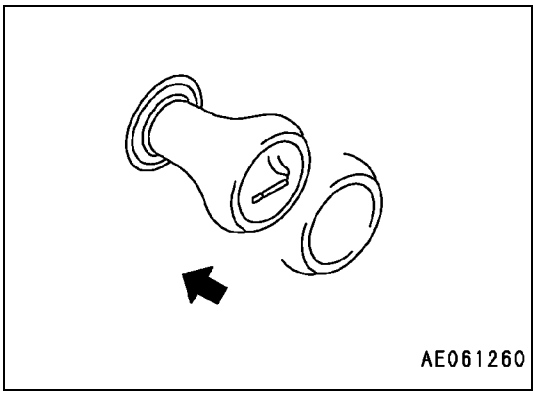
Position (c): Wiper is operated

Position (d): Washer fluid is sprayed, wiper is operating



CIGARETTE LIGHTER

This is used to light cigarettes. After cigarette lighter (15) is pushed in, it will return to its original position after a few seconds, then you may pull it out and light a cigarette.



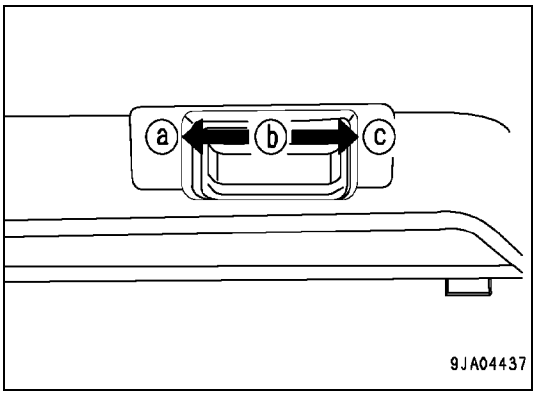
CAB LAMP SWITCH

Switch (16) is used to turn the cab lamp ON and OFF.

Position (a): OFF

Position (b): Lights up when the cab door opens

Position (c): Lights up

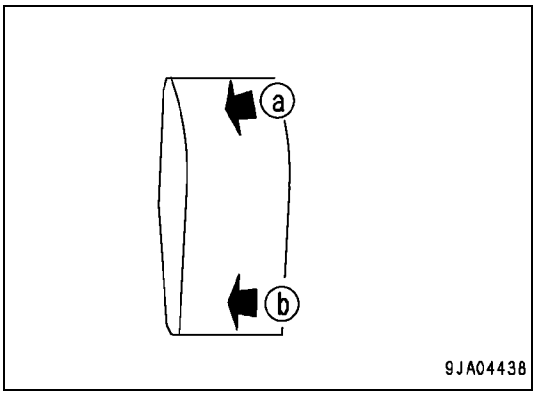


REAR WINDOW HEATER SWITCH

When switch (17) is pressed, the rear window heater is turned on.

Position (a): **ON** (removes mist from glass)

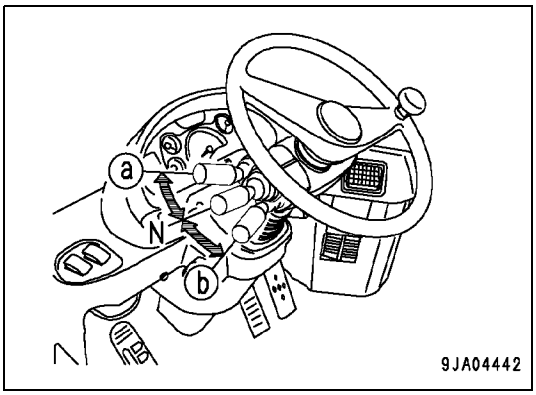
Position (b): **OFF**



CONTROLS

The control levers are used to control the direction and speed of the machine, stop the machine, operate the work equipment and park the machine. A good thorough understanding of these controls will help the operator in using the machine efficiently and safely.

DIRECTIONAL CONTROL LEVER

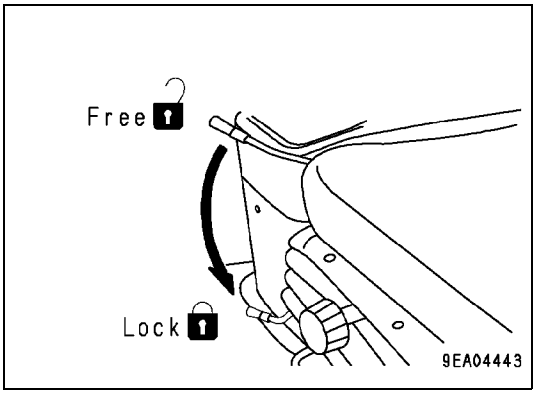


Lever (18) is used to change the direction of travel of the machine between forward and reverse.

When starting the engine, if the directional lever is not at the **N** position, the engine will not start.

Position (a): **FORWARD**
Position N: **NEUTRAL**
Position (b): **REVERSE**

WORK EQUIPMENT LOCK LEVER



Lever (19) is a locking device for the work equipment control levers. Once the lever is set in the locked position the work equipment will not operate. To set or lock the work equipment push the safety lock lever down to lock it. To release the work equipment for use, pull the lever upward to unlock.

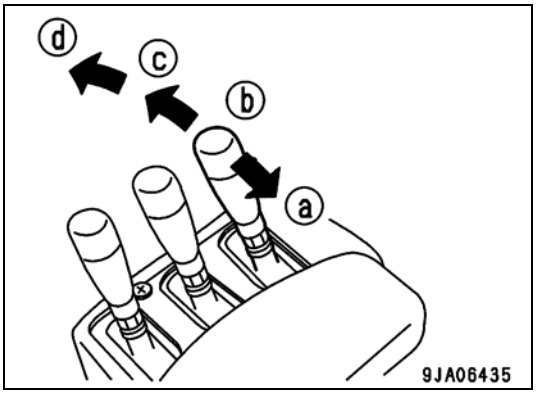
Remark

When setting the work equipment lock lever in the lock position be sure the work equipment is fully placed on the ground

WARNING

Before leaving the operator's seat, set the work equipment lock lever securely in the LOCK position. If the equipment lock lever is not fully in the LOCK position, and work equipment control levers are touched by mistake, accidental movement of the work equipment may result.

LIFT ARM CONTROL LEVER



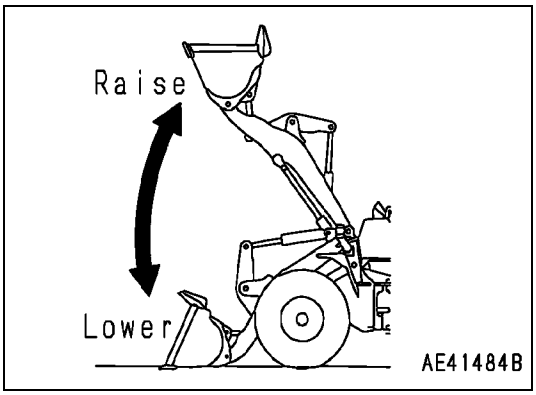
Lever (20) is used to operate the lift arm.

Position (a): **RAISE**
When the lift arm control lever is pulled back the arm is raised. If it is pulled back further from in RAISE position, the lever will lock in this position until the lift arm reaches at a preset position where it stops automatically.

Position (b): **HOLD**
When raising or lowering the lift arm by releasing the control lever the arm is kept in the desired position.

Position (c): **LOWER**
When the lift arm control lever is pushed forward the arm is lowered. Be careful not to lower the lift arm too fast, damage to the machine may result.

Position (d): **FLOAT**
Once the lift arm is fully lowered, by moving the control lever further forward the hydraulic system for the lift arm will be locked in a float position.



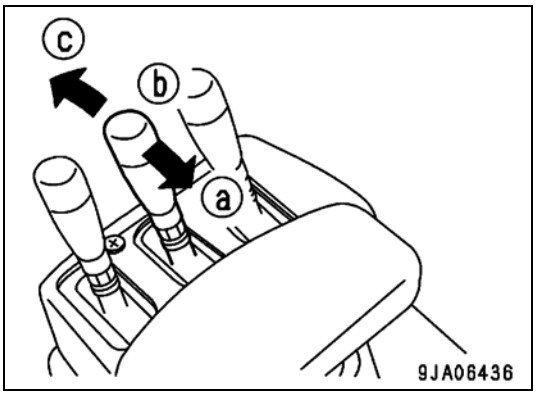
BUCKET CONTROL LEVER

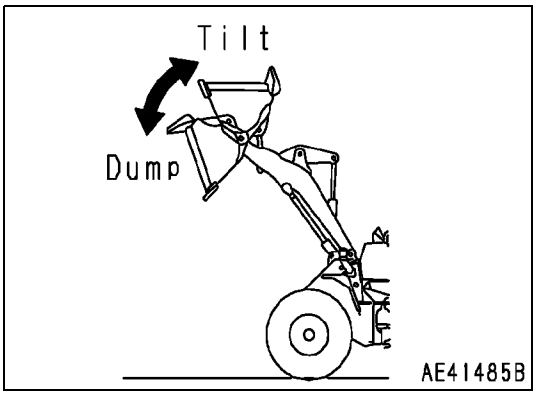
Lever (21) operates the bucket.

Position (a): **TILT BACK**
When the bucket control lever is pulled back the bucket tilts back until the control lever is released.

Position (b): **HOLD**
When tilting back or dumping the bucket by releasing the control lever the bucket is kept in the desired position.

Position (c): **DUMP**
When the control lever is pushed forward the bucket dumps the load.





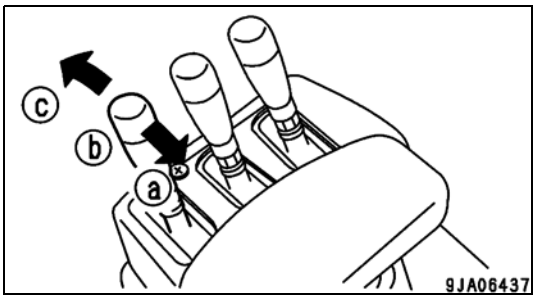
AUXILIARY CONTROL LEVER

When a multipurpose bucket is installed this lever has three positions

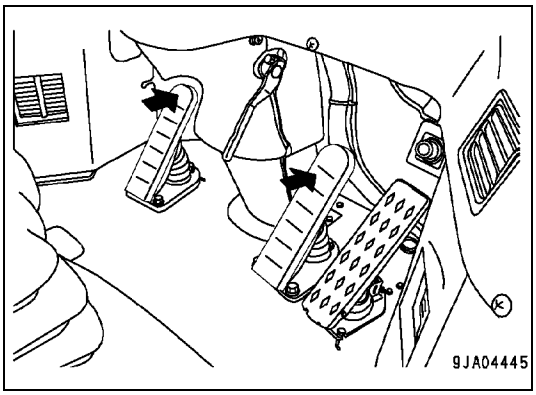
Position (a): **CLAM CLOSED**

Position (b): **HOLD**

Position (c): **CLAM CLOSED**



BRAKE PEDALS



Pedals (22) operate the brakes. Use the brake pedal for normal braking operations. The left and right pedals are interconnected and work together.

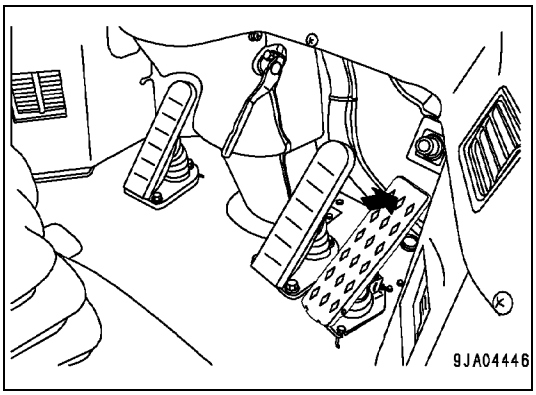
Brake Pedal (right)

This pedal is used for normal braking operations including traveling with the machine or slowing the machine down. Depress the pedal to slow or stop the machine.

Brake Pedal (left)

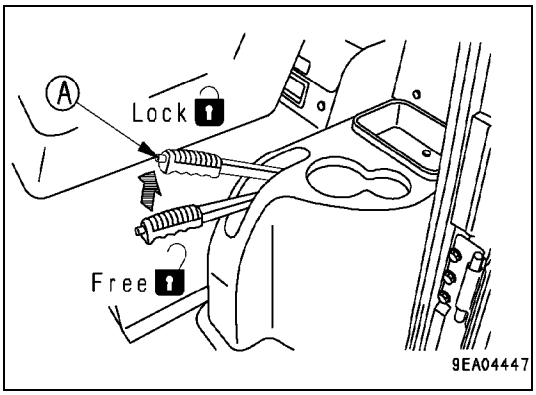
This pedal works in conjunction with the right brake pedal on the machine. It is used to stop the machine and aid in loader operations when the engine speed must be at a high RPM due to a heavy load in the bucket. By depressing this pedal and using the accelerator pedal at the same time in coordination, controlled loader operations are possible.

ACCELERATOR PEDAL



Pedal (23) controls the engine speed and output. The engine speed can be freely controlled between low idle RPM to full speed RPM.

PARKING BRAKE LEVER



Lever (24) operates the parking brake.

Pull the lever up to the **LOCK** position to set the parking brake. At the same time, the parking brake warning lamp will light up.

To release the brake, pull the lever up slightly, then press button (A) in and return the parking brake lever down to the **FREE** position. At the same time, the parking brake warning lamp will go out.

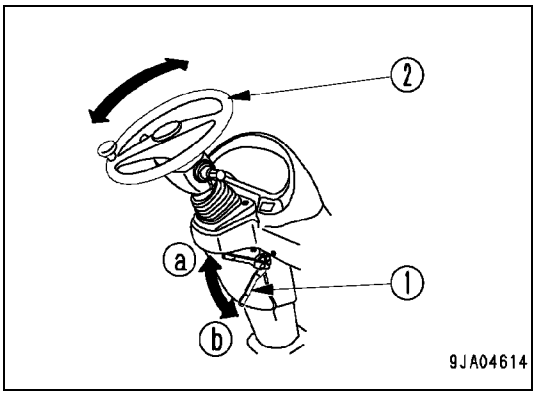
⚠ WARNING

Never use the parking brake to stop the machine unless necessary in an emergency situation.

Remark

If the directional lever is placed in the FORWARD or REVERSE position with the parking brake applied, the central warning lamp will light up and the buzzer will sound. Before operating the directional lever, check that the parking brake lever is in the FREE position. When the parking brake is applied, the machine will not move even if the directional lever is operated.

STEERING TILT LOCK LEVER



Lever (25) allows the steering column to be tilted forward or backward.

Set the lever (1) to **FREE** position (a).

Set the steering wheel (2) to the desired position, then set lever (1) to **LOCK** position (b).

Remark

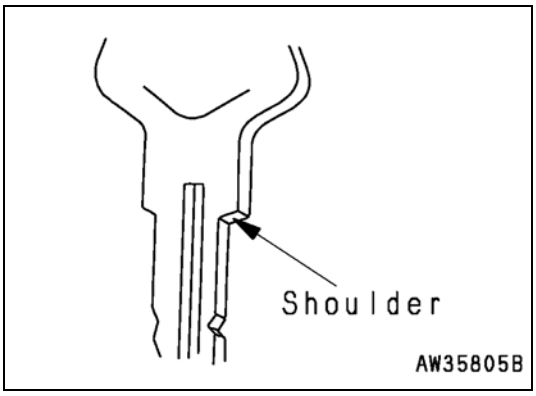
Always stop the machine before adjusting the steering wheel tilt position.

SECURITY, LOCKS AND SAFETY FEATURES

This machine is equipped with several security, locks and safety features designed to protect the operator, persons performing service, repair or inspections on the machine as well as the general public when the machine is not in use and unattended. It is important for the operator of the machine to know where these features are located and when to use them. Failure to do so may result in damage to the machine or injury to personnel.

IGNITION KEY LOCKED AREAS

These areas require the ignition key to lock and secure them. Whenever you leave the machine unattended for any length of time it is advised to lock and secure the machine safely. Doing so will prevent unauthorized personnel from accessing the machine.

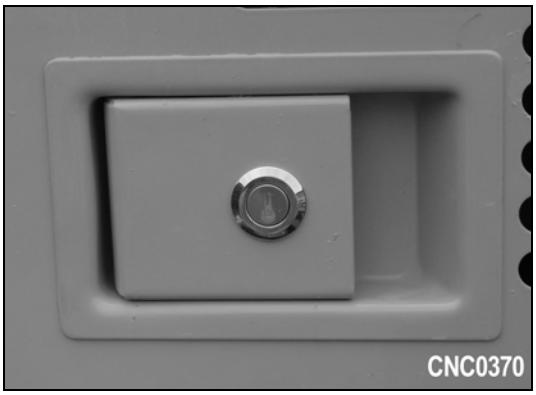


CAB DOOR LOCKS

Both cab doors are equipped with a key lock. Locking the cab prevents access to the machine operating controls.

ENGINE ACCESS DOORS

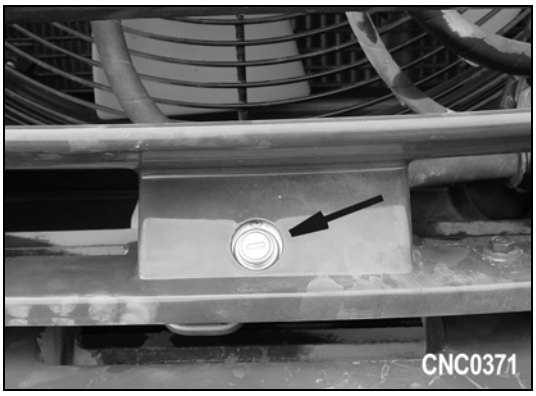
Both sides of the engine access doors right and left are set up with a security lock to prevent unauthorized access. Always keep these doors locked to avoid the possibility of vandalism.



REAR GRIL AND FUEL CAP

Rear Grill

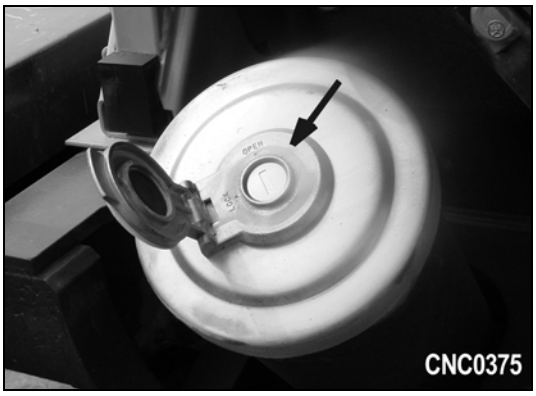
To access the fuel tank fill cap, both the rear grill and fuel cap are locked. The lock for the rear grill is located on the lower portion of the grill.



Fuel Cap

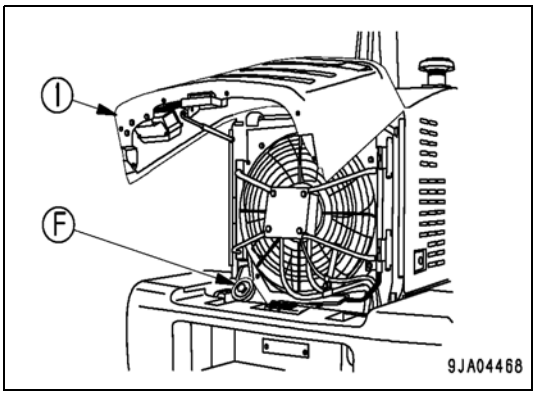
After refueling the machine lock the fuel tank cap as well as the grill.

To unlock the fuel tank cap insert the ignition key and turn the key to the **OPEN** position, remove the key and unscrew the cap. To lock, fully install the cap, insert the ignition key and turn the key to the **LOCK** position, after locking, remove the ignition key.



If the level is low, open rear grill and add through filler port (F) to fill the tank.

After adding fuel, tighten the cap securely and lock. Fuel tank capacity: 228 liters (60.24 US gal)



PADLOCKED AREAS

Several areas are secured with a latching device and a padlock. These areas must be locked at all times to avoid unnecessary tampering.

BATTERY AND TOOL BOX

Both battery and tool boxes are locked and should only be accessed by maintenance personnel.

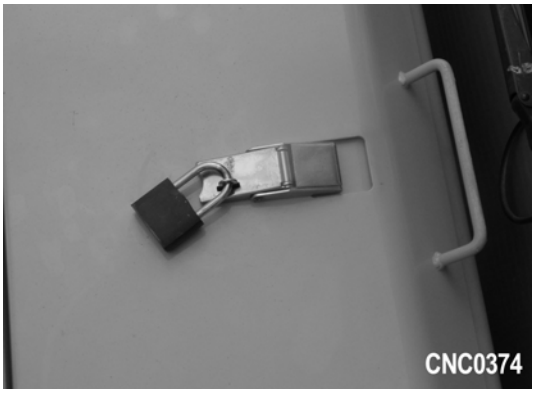
TRANSFER CASE

The transfer case fill access is secured with a pad lock, the location is on the left side of the machine under the steps.

UPPER HOOD ACCESS PANEL

This area contains the system for the cab environment. This lock must remain in place and only be removed by maintenance personnel. It is located behind the cab on the front part of the hood top.

It is important to remember when performing a daily inspection that all locks are in place and the area is properly secured. Never leave the machine with these areas unsecured.

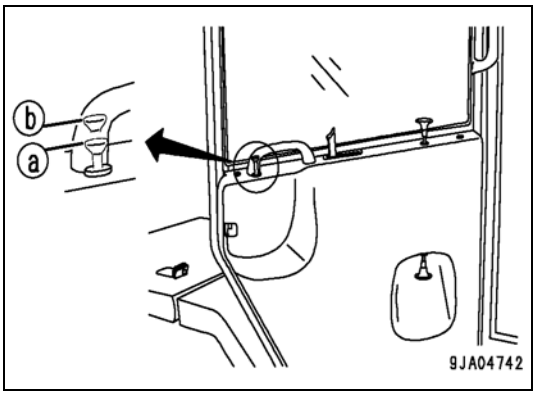


CAB DOORS AND WINDOWS

CAB DOOR LOCK BUTTON

The cab door lock button is used to lock the cab doors from the inside.

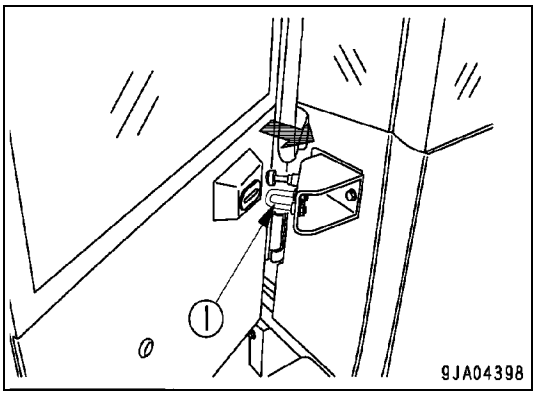
(Right or left door)
Press cab door lock button to lock the door.
Position (a): Lock
Position (b): Release



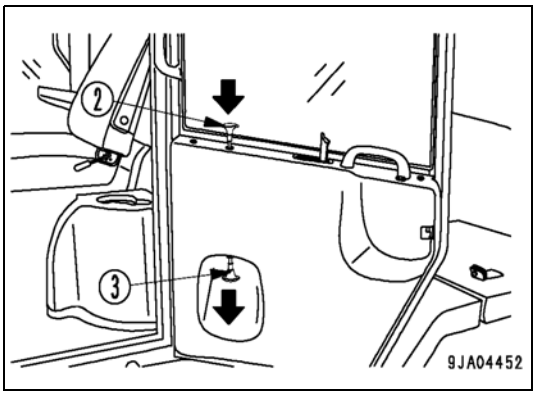
CAB DOOR OPEN LOCK

When getting in or out of the operator's compartment, or when operating with the door open, use this lock to hold the door in the open position.

- Push the door against catch (1) to lock it in position.
- When attaching the door in position, lock it firmly to the catch.
- When getting on or off the machine, hold the handrail on the inside of the door frame.

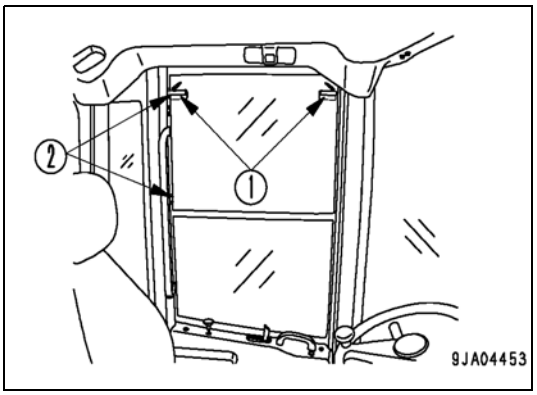


- When closing the door from the operator's seat, push knob (2) to release the catch.
- When closing the door after getting off the machine, pull knob (3) to release the catch.



CAB WINDOW LOCK CANCEL KNOB

Use this knob when you want to move the door window glass up or down to open or close it. Grip lock cancel knob (1) to release the lock, and move it down to a lower lock position. Release lock cancel knob (1). There is 1 point for lock position (2).



SAFETY LOCK BAR

Since this machine is designed to operate on an articulating steering set up it is important to know where the articulating safety lock bar is located, how to use this safety lock bar and when to use the lock.

Key Points To Remember Regarding Safety Lock Bar

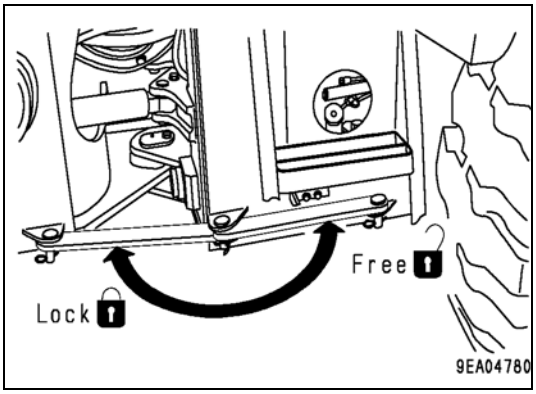
When performing a preoperational inspection be sure the safety lock bar is in the **FREE** position and properly secured in place for normal machine operations. This safety lock is located below the cab access ladder on the left side of the machine.

When performing any maintenance or repairs to the machine be sure the safety lock bar is set in the **LOCK** position.

When transporting the machine, after loading the machine on the transport vehicle, place the safety lock bar in the **LOCK** position.

Remark

When placing the safety bar lock in the LOCK position it is advised to tag the steering wheel as a reminder that this device is in place.

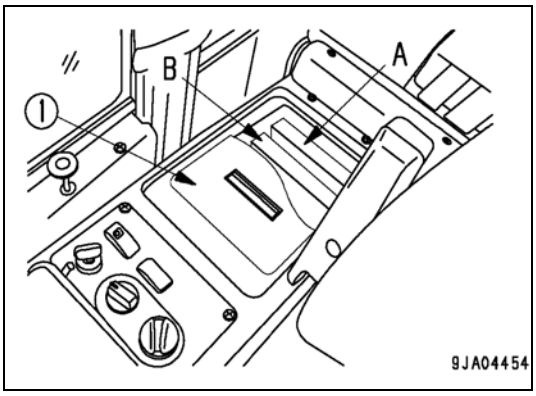


FUSES AND ELECTRICAL OUTLETS

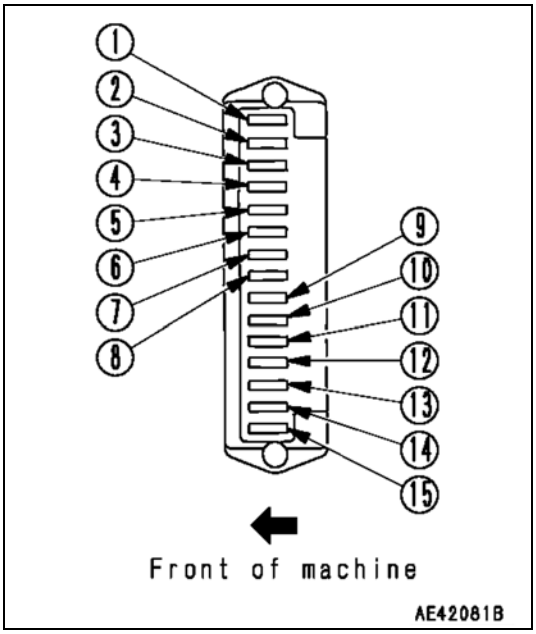
Before replacing a fuse, be sure to turn off the ignition switch. The fuses protect the electrical equipment and wiring from damage or the possibility of fire. If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse. Replace the fuse with another of the same capacity. Never substitute a fuse of a higher capacity. Damage to the electrical system may result.

FUSE PANEL

The fuse panel is located to the right of the drivers seat behind the control council. Remove cover 1 to access fuse boxes (A) and (B)



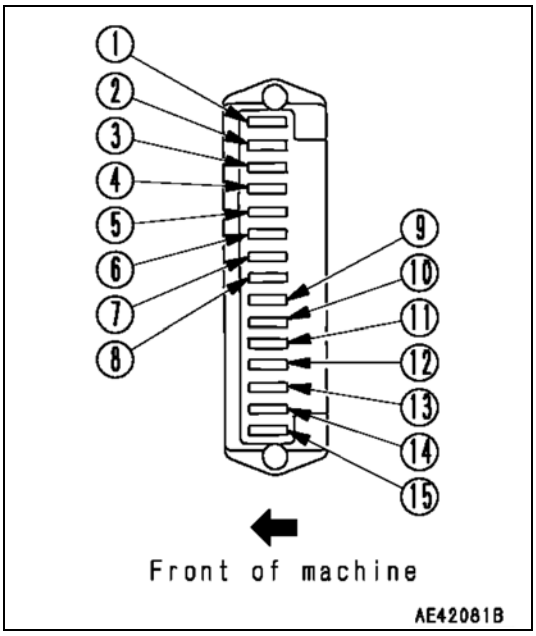
FUSE BOX (A)



No.	Fuse capacity	Name of circuit
1	20A	Ignition switch
2	10A	Hazard warning flashing lamp
3	10A	HST control A
4	10A	Parking brake A
5	10A	Instrument panel
6	10A	Radio A, Cab lamp
7	10A	Auxiliary power outlet (24V)
8	10A	Left head lamp
9	10A	Right head lamp
10	10A	Turn signal lamp
11	10A	Back lamp, Stop lamp
12	20A	HST control B
13	10A	Work equipment positioner
14	10A	Wiper control
15	10A	Radio B

FUSE BOX (B)

No.	Fuse capacity	Name of circuit
1	20A	Air conditioner A
2	20A	Air conditioner B
3	10A	Beacon lamp (if equipped)
4	10A	KOMTRAX
5	10A	Not used
6	20A	Auxiliary power (key on 24V)
7	10A	D/C converter (if equipped)
8	10A	Parking brake B
9	10A	Horn
10	10A	Side marker lamp (left)
11	10A	Side marker lamp (right)
12	20A	Front work lamps
13	20A	Rear work lamps
14	10A	Auxiliary
15	10A	Auxiliary

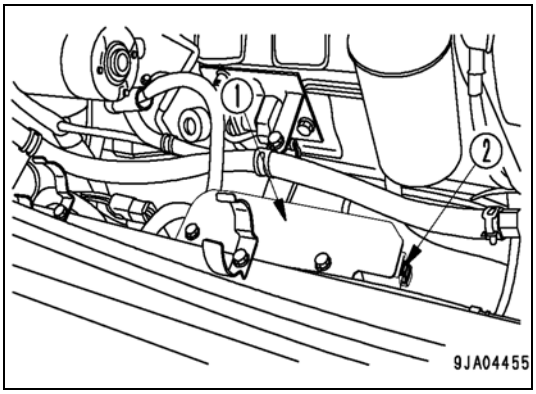


SLOW BLOW FUSE

If the power does not come on when the ignition switch is turned ON, the slow blow fuse may be blown, check and replace it if necessary. The slow blow fuse is beside the engine on the left side of the machine.

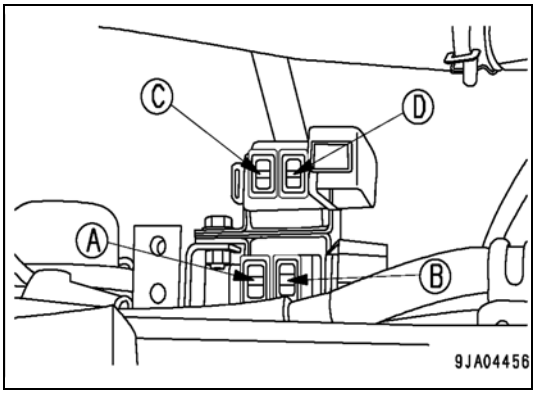
1. Open the cover (1).

2. Open the cover of slow blow fuse box (2) and inspect.



Slow Blow Fuse

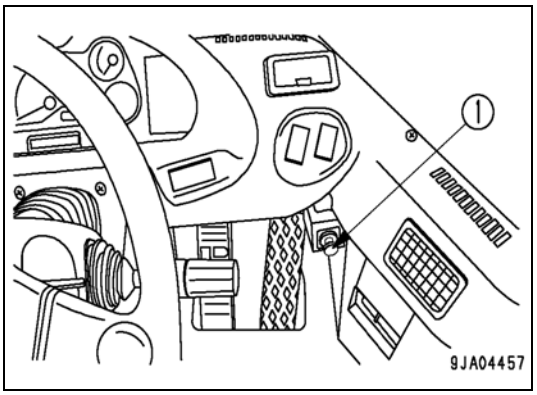
(A) 80A: Chassis power source
(B) 120A: Engine preheating power source
(C) 30A Battery power (starting switch, hazard)
(D) 30A: Fuel solenoid power source



ADDITIONAL FEATURES

POWER OUTLET

Removing the cigarette lighter (1) allows use of its power. The maximum electric current is 7 A (168 W).

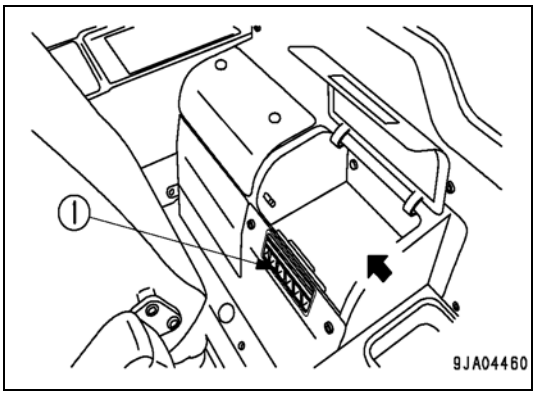


COOL BOX

When using the cooling box to keeping drinks and other things cool or when the heating mode is being used, to keep things warm.

When using the box, open the vent grill (1).
When not using the box, close the grill (1).

Do not use the cool box for things which leak or break easily. Do not use it as a storage for tools or other small objects.

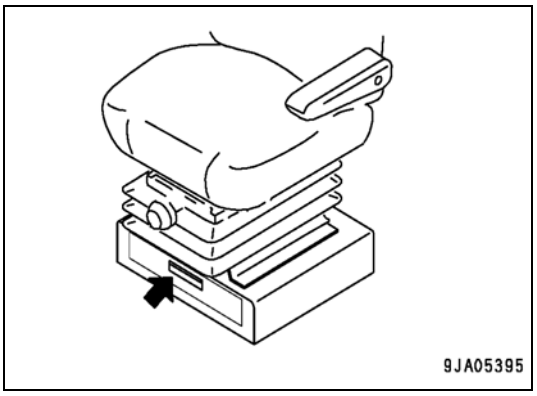


STORAGE BOX

This is under the operator's seat. Use this box to keep small items and tools.

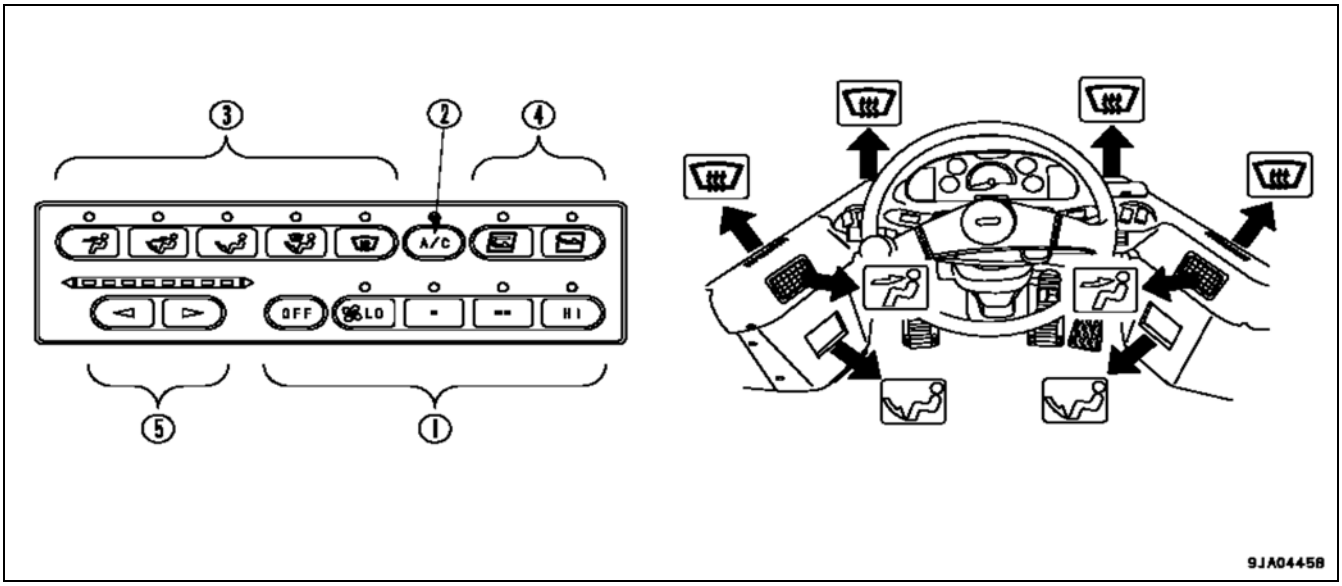
Remark

The storage box is not waterproof. When washing the floor, remove all documents and other items that may be damaged by water, and keep them in a waterproof bag.



AIR CONDITIONING SYSTEM

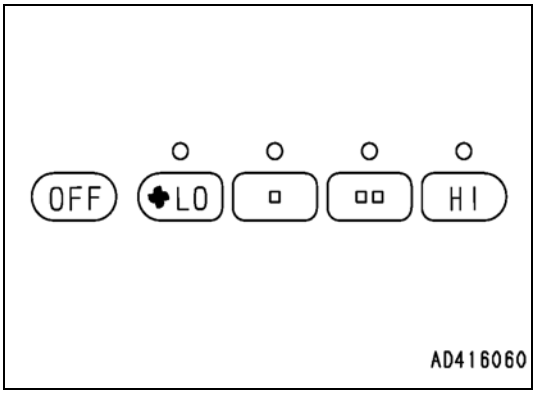
By taking fresh air into the cab through a filter, it is possible to control the atmosphere inside the cab. This makes it possible to provide a pleasant working environment even on dusty job sites for the operator.



1.Blower Motor Switch	2.Air Conditioner Switch
3.Mode Selector Switch	4.FRESH/RECIRC Selector Switch
5.Temperature Control Switch	

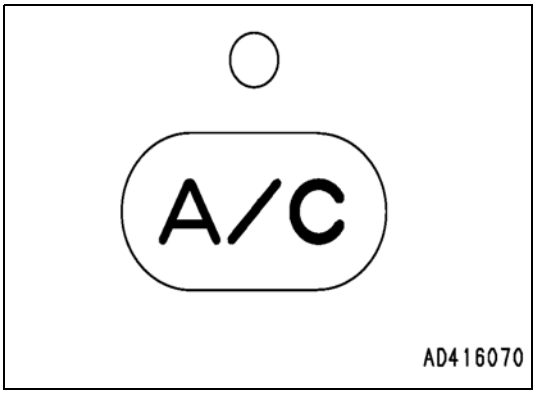
BLOWER MOTOR SWITCH

Switch (1) can be used to adjust the air flow to four stages.It also acts as the main switch for the air conditioner. When the OFF switch is pressed, the fan stops. When the switch is pressed, the indicator lamp above the switch lights up to display the air flow.

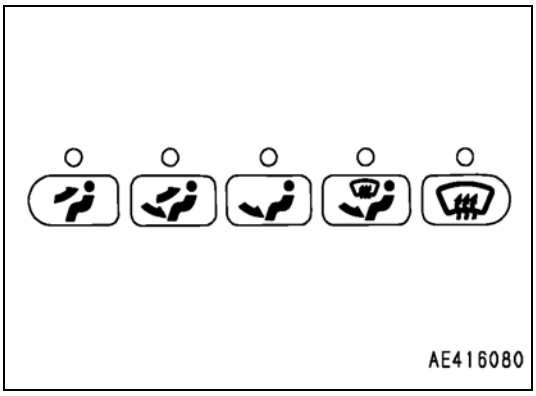


AIR CONDITIONER SWITCH

Switch (2) is used to start or stop the cooling or dehumidifying function. When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up. When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.



MODE SELECTOR SWITCH

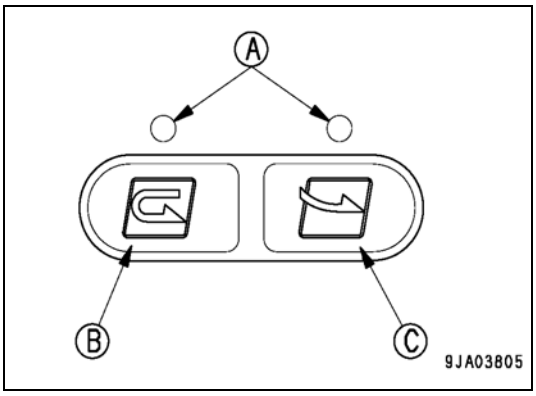


Switch (3) is used to select the vents.

The following five vent modes are available: FACE, FACE/ FOOT, FOOT, FOOT/DEF, DEF.

When the switch is pressed, the indicator lamp above the switch lights up to display the vent mode.

(FRESH/RECIRC) SELECTOR SWITCH

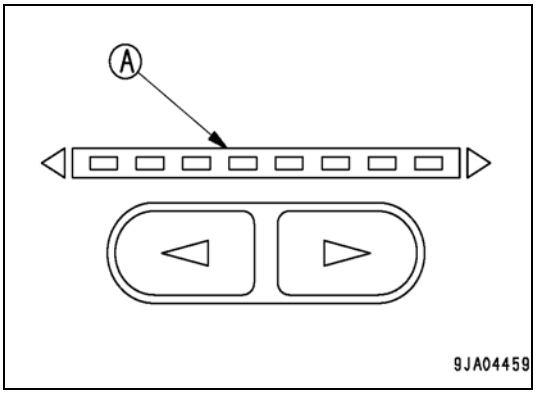


Switch (4) is used to select between recirculation of the air inside the cab or intake of fresh air from the outside. When the switch is pressed, indicator lamp (A) at the top of the switch lights up.

Recirculation of air inside cab:
Press switch (B) to use only the air inside the cab. Use this position for rapid heating or cooling or when the outside air is dirty.

Intake of fresh air from outside:
Press this switch (C) to carry out heating or cooling with fresh air from the outside. Use this position when removing mist from the cab windows.

TEMPERATURE CONTROL SWITCH



The temperature can be adjusted with switch (5) by pressing and holding the up or down button. The temperature level indicator lamps (A) light up to display the temperature of the air coming from the vents. The more blue the lamps are, the lower the temperature is.

The color of the indicator lamp (A) changes while the switch is being pressed. When the temperature reaches the desired level, release the switch to set the temperature. The settings for each mode are retained in memory even when the ignition switch is turned OFF.

However, in the following cases, the settings must be adjusted again.

- When the machine has been out of use for more than 7 days
- When the battery voltage is extremely low
- When there has been interference from outside
- When the fan switch is turned OFF (the setting is not kept in memory with only the air conditioner switch)

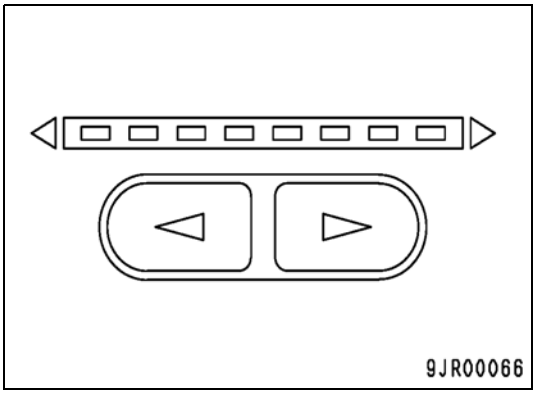
If the air conditioner is used in the FRESH position, the inside of the cab will be pressurized, this will prevent the entry of dust. The higher the position of the fan switch, the more effective the pressurizing becomes.

CLIMATE CONTROL OPERATION

Condition of use		Fan Switch	A/C Switch	Temp. Control	Air Select Switch	Mode Select Switch
Cooling	Rapid	HI	ON	Blue	RECIRC	FACE
	Normal	HI - LO	ON	Half blue	FRESH	FACE
Dehumidifying, heating		HI - LO	ON	Blue/red	FRESH	FOOT
Heating	Rapid	HI	OFF	Red	RECIRC	FOOT
	Normal	HI - LO	OFF	Half red	FRESH	FOOT
Defroster		HI	ON	Red/blue	FRESH	DEF
Vent		HI - LO	OFF	Blue	FRESH	FACE

When defrosting, if the temperature control switch is set so that all lamps are red, this will improve the performance for defrosting and demising.

Set the vent mode selector switch to the intermediate position to give the desired condition. With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off. However, do not set to the FACE mode with the vents closed.

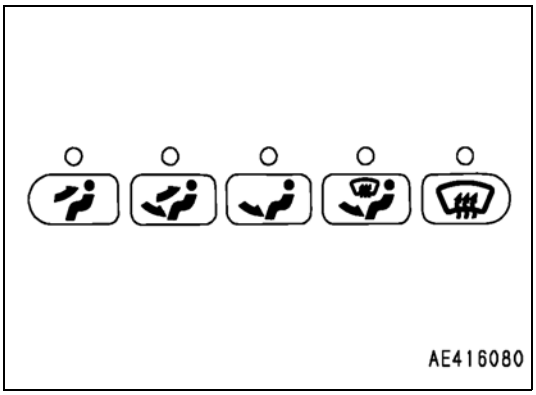


WHEN NOT USING THE AIR CONDITIONER

Run the air conditioner in cooling or dehumidification + heating for several minutes from time to time to prevent the loss of the oil film on various parts of the compressor system.

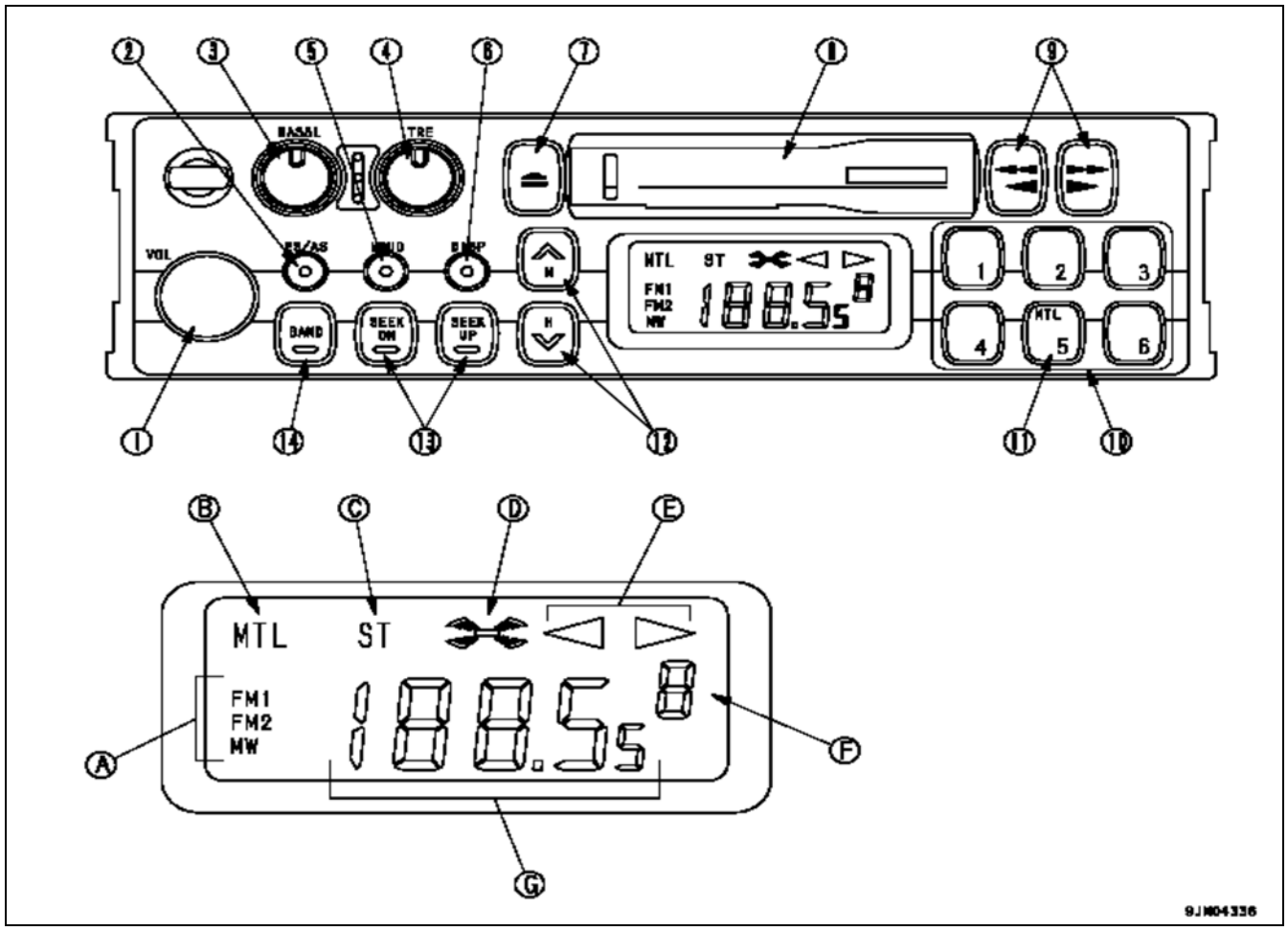
Remark

If the temperature inside the cab is low, the air conditioner may not work. In such cases, use the recirculated air to heat up the inside of the cab, then turn the air conditioner switch on to run the air conditioner.



AM/FM RADIO-CASSETTE STEREO

The AM/FM radio offers the addition of music and pleasant sounds for the operator to enjoy while operating the machine for long periods of time. However, using the radio during machine operations may lead to distractions. When using the radio always be aware of what you are doing and your operating environment. Do not allow yourself to become distracted by the radio.



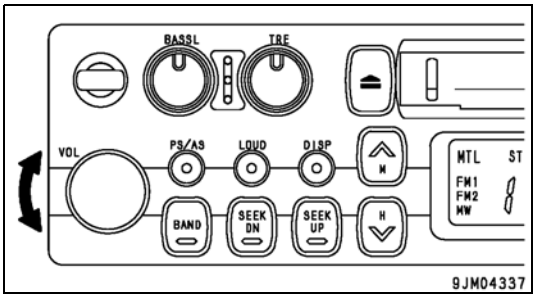
1.Power Switch/volume	2.Auto-store/preset Scan Button	3.Bass Control Knob
4.Treble Control Knob	5.Loudness Button	6.Time/radio Display Selector Button
7.Tape Eject Button	8.Cassette Door	9.Fast Forward/rewind Button
10.Preset Buttons	11.Metal Tape Button	12.Manual Tuning Buttons
13.Seek Button	14.Band Select Button	

A. Band Display	B. Metal Tape Display
C. Fm Stereo Reception Display	D. Loudness Display
E. Tape Direction Display	F. Preset Channel Display
G. Time/frequency Display	

RADIO OPERATION

POWER SWITCH/VOLUME

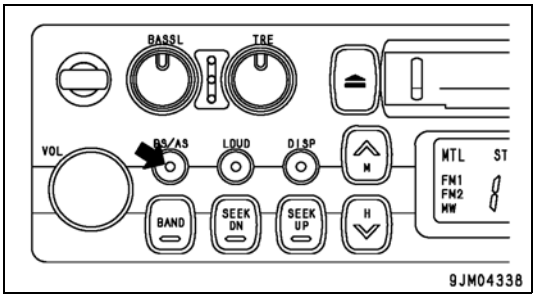
Turn this knob (1) to the right until it clicks to turn the power on. Turn it further to increase the volume.



AUTO-STORE/PRESET SCAN BUTTON

Use this button (2) to actuate the preset scan and auto-store functions.

Auto-store:
Each time this button is pressed for more than 2 seconds while in radio reception range, the auto-store function automatically starts to search for the desired station within a receivable band, and memorizes the frequency. During this scanning process, the frequency shown in the right side of display continues to change. This indicates that each frequency is memorized in auto store.



Preset scan:
If this button is pressed for less than 0.5 second while in radio reception range, programs from the six preset stations in the same band will be broadcast one after another for 5 seconds each, starting from No. 1 through 6 stations consecutively.When the desired station is arrived at, press the button again, which stops this preset scan tuning process and switches to ordinary broadcasting. The same process will be repeated continuously until the button suppressed again.

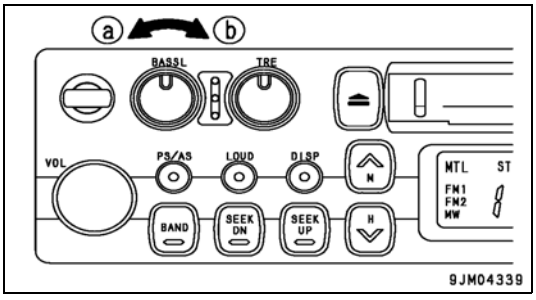
Remark

The auto-store function cannot be used when the channel display is flashing. When the display is flashing, the preset scan function is being used.

BASS CONTROL KNOB

Turn this button (3) to the left to reduce the low tones; turn it to the right to emphasize the low tones.

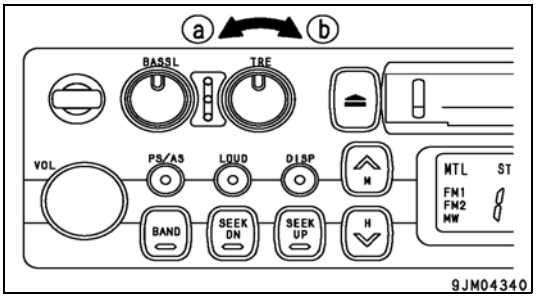
Direction (a): Low tone reduced
Direction (b): Low tone emphasized



TREBLE CONTROL KNOB

Turn this button (4) to the left to reduce the low tones; turn it to the right to emphasize the high tones.

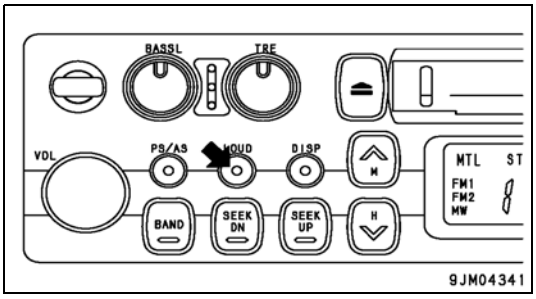
Direction (a): High tone reduced
Direction (b): High tone emphasized



LOUDNESS BUTTON

This button (5) is used when playing at low volume. It makes it possible to hear more easily by emphasizing the low tone when the low tones are weak.

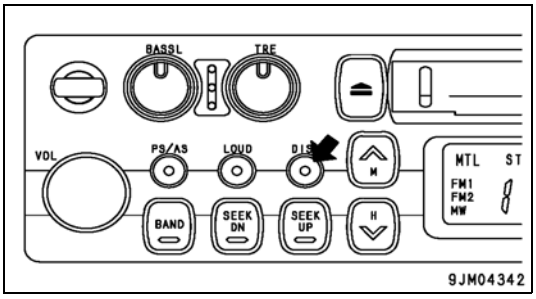
Push button: Actuated (ON)
Push button again: Canceled (OFF)



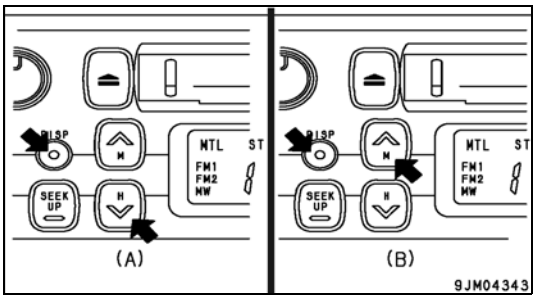
TIME/RADIO DISPLAY SELECTOR BUTTON

This button (6) is used to switch between the Radio/tape display and the Time display.

Correcting the time:
Press the button to set the time display.

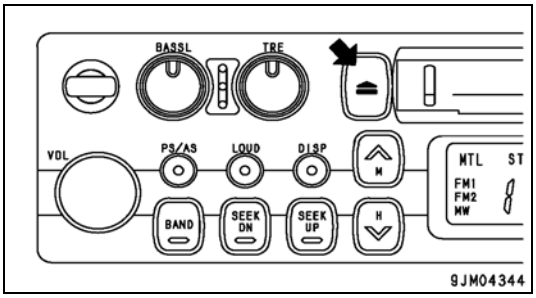


Correcting hour:
Keep the DISP button pressed and press the bottom (H) of the TUNING button to correct the hour.
Correcting minute:
Keep the DISP button pressed and press the top (M) of the TUNING button to correct the minute.



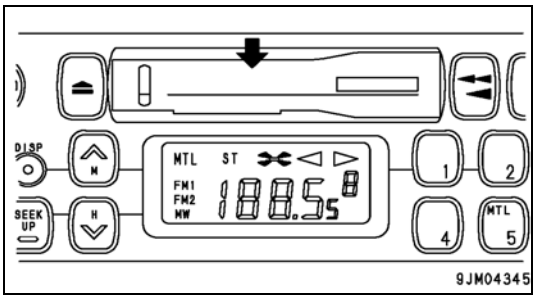
TAPE EJECT BUTTON

This button (7) is used to stop the tape and to eject the cassette. When this button is pressed, the tape is ejected and the radio plays.

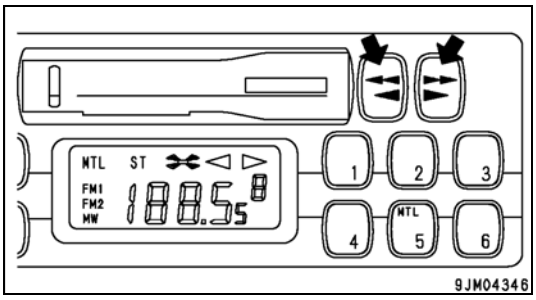


CASSETTE DOOR

Set the cassette with the exposed portion of the tape on the right side and insert it in cassette door (8).



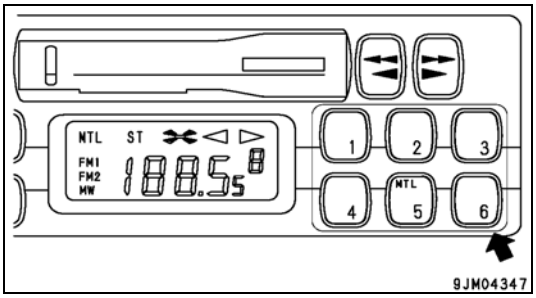
FAST FORWARD, REWIND BUTTONS



These buttons (9) are used to fast forward or rewind the tape.

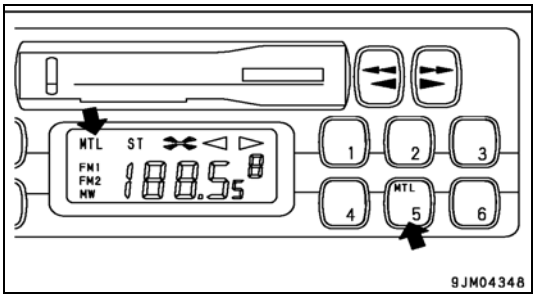
Fast forward/rewind:
If you press the button pointing in the same direction as the lighted arrow indicating the direction of play, the tape will be fast forwarded; if you press the button pointing in the opposite direction, the tape will rewind. To stop the tape, lightly press the button that is not locked. The fast forward or rewind operation will be canceled. If the fast forward and rewind button are pressed at the same time, the tape will change sides.

PRESET BUTTONS



These buttons (10) are used to call up the broadcast station frequencies preset in memory for each of buttons No.1 to No.6. It is possible to preset 18 stations (FM:12; AM:6) with these buttons.

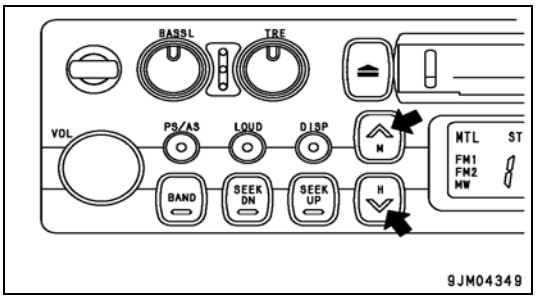
METAL TAPE BUTTON



Used also for preset button No.5

This button (11) is used when playing a metal or chrome tape. This button is used also for preset button No.5. When it is pressed, MTL appears on the display.

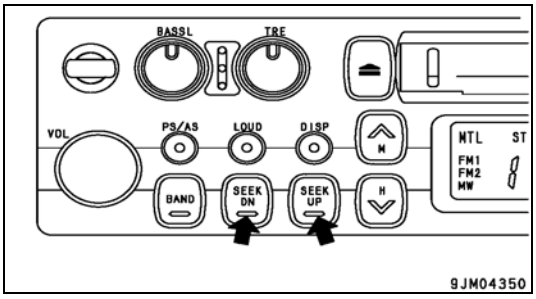
MANUAL TUNING BUTTONS



These buttons (12) are used for manual tuning.

When TUN V button is pressed, the frequency goes up; when TUN button is pressed, the frequency goes down. If the button is pressed down and held, the frequency will change continuously.

SEEK TUNING BUTTONS

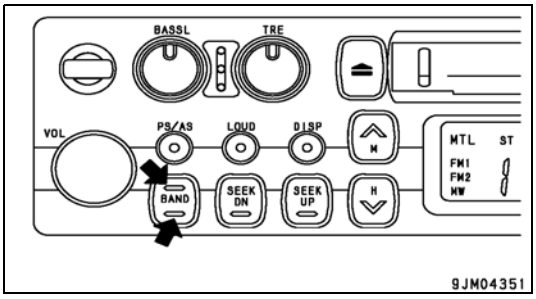


These buttons (13) are used to seek tuning.

When the SEEK UP button is pressed, the frequency automatically goes up; when the SEEK DOWN button is pressed, the frequency automatically goes down. When the next station that can be received is found, it automatically stops.

BAND SELECTOR BUTTON

When this button (14) is pressed, the band is switched between FM1, FM2, and MW (AM). The band is shown on the display.

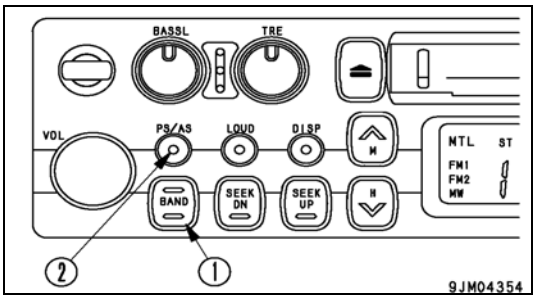


USING RADIO FEATURE

It is possible to preset 6 MW (AM) stations and 12 FM stations (FM1: 6 stations, FM2: 6 stations).

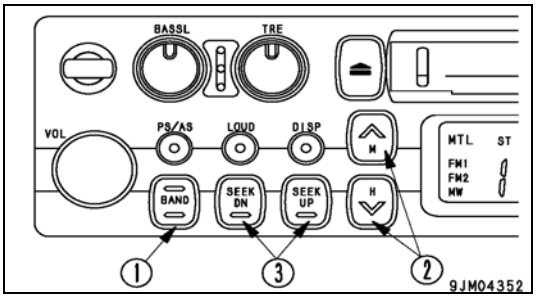
USING AUTO PRESET

- Use band selector button (1) to select MW (AM), FM1 or FM2.
- Auto-store/preset scan button (2) is pressed for less than 0.5 seconds.
- The preset scan tuning function automatically searches for the desired station within the same band and memorize as many as six stations in the preset memory.



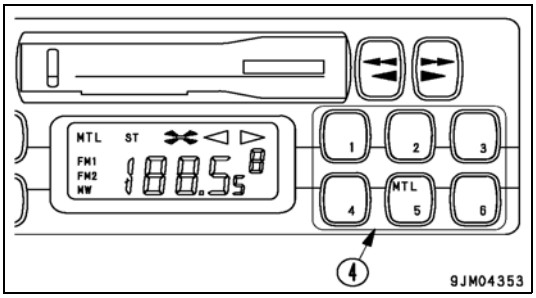
USING MANUAL PRESET

- Use band selector button (1) to select MW (AM), FM1 or FM2.
- Press manual tuning button (2) or seek tuning button (3).
- Press preset button (4) of the number to be preset for 2 seconds while the frequency display is being shown on the display. (The preset channel and frequency are displayed and the presetting is completed).
- Repeat the steps explained in Item 2 and 3 above to preset other stations to the subsequent numbers.
- If you want to preset a station in the other bands, follow the steps explained in Item 1 through 4 above.

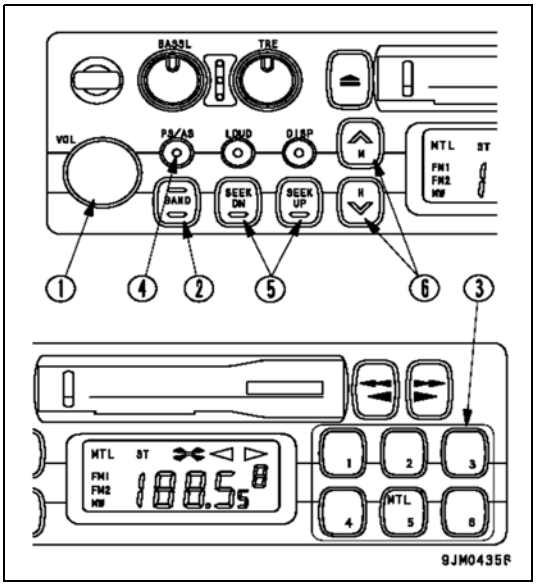


Remark

Changing the setting of a preset station. When the power is disconnected, such as when the battery is replaced, all the settings are deleted.



LISTENING TO RADIO



- Turn the ignition switch ON, then turn power switch (1) ON.
- Use band selector button (2) to select MW (AM), FM1 or FM2.
- Select the station with the preset buttons (3).

Remark

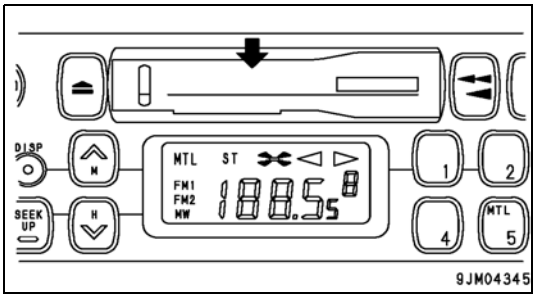
In case you do not remember the number assigned to a certain preset station, press auto-store/preset scan button (4) for less than 0.5 second. The preset six stations will broadcast one after another for five seconds each. When the desired station comes around, press the button again and scan tuning stops there.

- If you want to tune in to a station that is not preset, use either seek tuning button (5) or manual tuning button (6).
- Adjust the volume, balance, and tone as desired.
- When turning the radio OFF, turn power switch (1) to the left until there is a click.

Remark

To switch to the radio when listening to a cassette, press the cassette eject button to stop the tape. If you insert a cassette when listening to the radio, the tape will start to play.

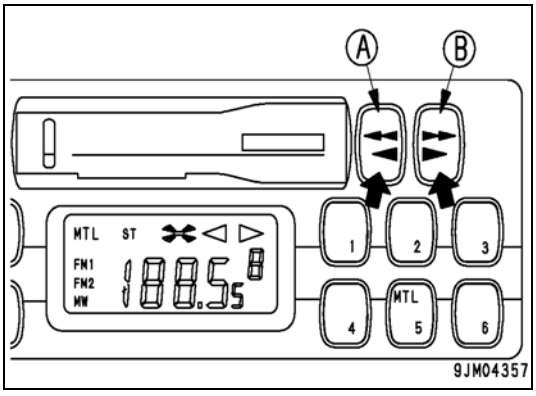
LISTENING TO CASSETTE TAPE



- Turn the ignition switch ON, then turn power switch (1) ON.
- Set the cassette with the exposed portion of the tape on the right side and push it into the cassette door. The tape will automatically start playing. If the arrow indicating the direction of play is pointing to the right, the top side is being played; if the arrow is pointing to the left, the bottom side is being played. When the tape reaches the end, it is automatically reversed and the other side starts to play.
- When finishing with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.

REVERSING TAPE

When listening to the tape, press both FAST FORWARD, REWIND buttons (A) and (B) at the same time lightly. When this is done, the tape direction display will be reversed.



START-UP PREPERATIONS AND CHECKS

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 tool carrier or loading bucket, 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 and dump 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.

M. Check the condition of the fenders, steps, mud flaps and sheet metal covers be sure they are not loose, damaged or missing.

N. Be sure the safety lock bar is securely fastened in the **FREE** position.

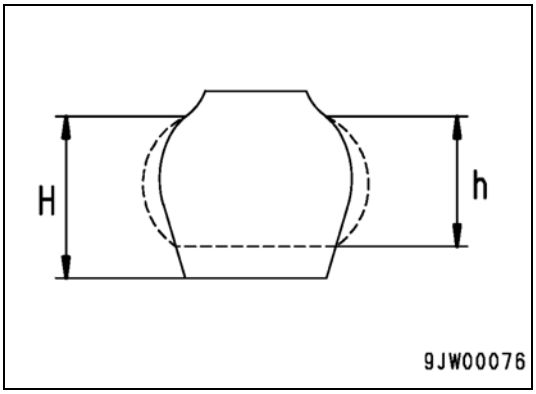
TIRE PRESSURES AND CHECKS

WARNING

If the tires show excessive ware, damage or look unusual contact your Komatsu dealer immediately. Do not operate the machine with under inflated, worn or damaged tires.

Measure the tire pressure before starting operations and when the tires are cool. If the tire inflation pressure is too low, the tires will be overload; if it is too high, it may cause tire cuts or shock burst. To prevent these problems, adjust the tire inflation pressure according to the table below. Deflection ratio = H - h / H x 100

If the deflection of the tire is excessive, raise the inflation pressure within the limits given in the table to give a suitable deflection.



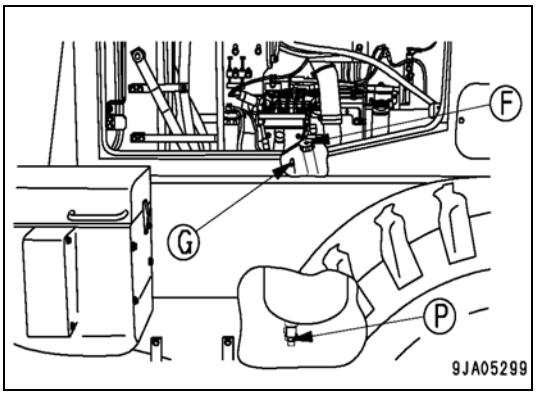
Tire Size (Pattern)	Inflation Pressure MPa (kgf/cm^2, PSI)				
	Soft ground (sandy ground)	Normal road surface		When shipped from factory	
		Stockpile	Digging	Front Tire	Rear Tire
20.5-25-12PR (L2 Traction)	0.19 -0.32 (1.9 -3.3, 27.0 - 46.9)	0.19 -0.32 (1.9 -3.3, 27.0 - 46.9)	0.21 - 0.34 (2.1 - 3.5, 29.8 - 49.7)	0.32 (3.3, 46.9)	0.27 (2.8, 39.8)
20.5-25-12PR (L3 Rock)	0.19 - 0.32 (1.9 - 3.3, 27.0 - 46.9)	0.19 - 0.32 (1.9 - 3.3, 27.0 - 46.9)	0.21 - 0.34 (2.1 - 3.5, 29.8 - 49.7)	0.32 (3.3, 46.9)	0.27 (2.8, 39.8)

CHECKS UNDER THE HOOD

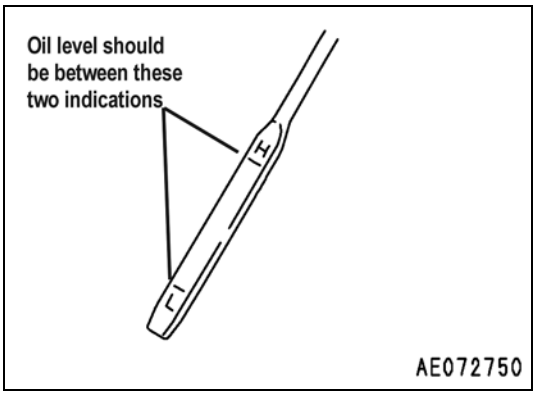
Oil Level

A. Be sure the machine is siting on a level surface before checking any fluid levels.

B. Open the hood side panels and check oil level. Remove dipstick (G) be sure oil level is within the specified range.



C. If oil level is low, add oil through fill port (F) if it is over full drain some oil out through the drain cock (P).

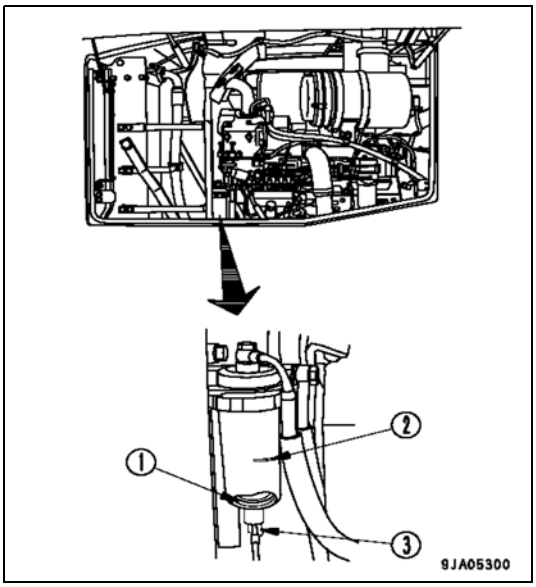


Water Separator

D. Check the water separator for any signs of water in the fuel, if traces of water are found in the separator, loosen drain plug (3) and drain the excess water from the separator until the float (1) falls to the bottom of the unit. Never allow the water level to go above the marking (2).

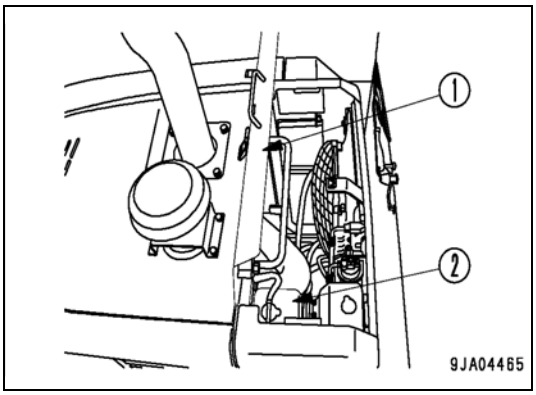
Remark

When draining oil from the engine or water from the water separator always trap and recover these fluids for recycling purposes, never drain them onto the ground. Failure to recover these fluids is in violation of EPA laws.



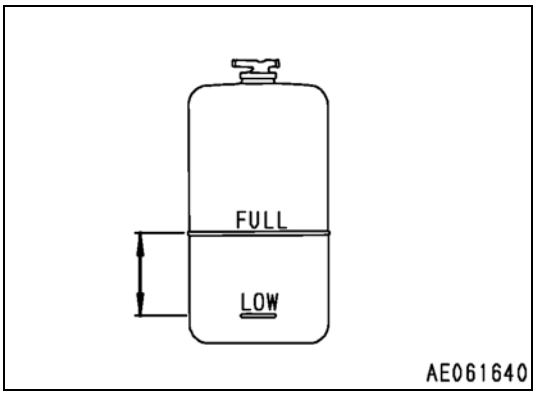
Engine Coolant Level

E. Open top cover (1) at the front of the engine hood and check the coolant level in the recovery tank (2), coolant level should be between the **FULL** and **LOW** marks. Add coolant if necessary.



F. Check the engine and radiator area 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.

G. Once finished, be sure the hood panels close properly and will lock securely to prevent tampering by others.

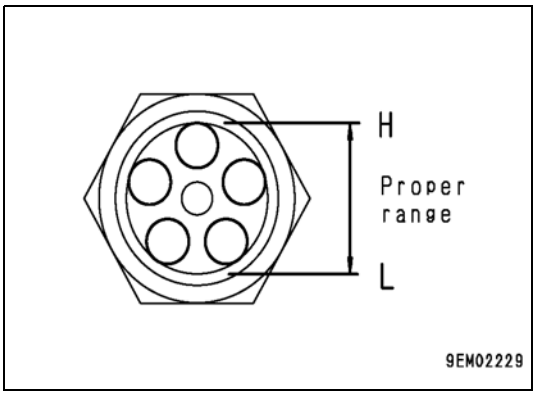


HST Fill Cap

H. Check to be sure the hydro static transmission fill cap is in place and locked. If you suspect the fluid level in the transmission is low have it inspected by a qualified maintenance personnel.

Hydraulic Fluid Level

I. With the work equipment on the ground and all controls neutralized check the hydraulic fluid in the hydraulic tank. The hydraulic tank is located on the right side of the machine behind the front frame under the access ladder. The fluid level should be between the (H) and (L) mark on the indicator located on the front panel of the tank. If you suspect the fluid level is low have it inspected by a qualified maintenance personnel.



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. Adjust the rear view mirror if necessary

D. Check the windows for cleanliness, remove any stickers or objects pasted to the windows.

E. Make sure the fire extinguisher is in place and in operating condition (if equipped).

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

G. Check to be sure the seat belt and seat works properly and is not worn or damaged.

H. Check the condition of the seat, be sure it is not damaged, loose or missing parts.

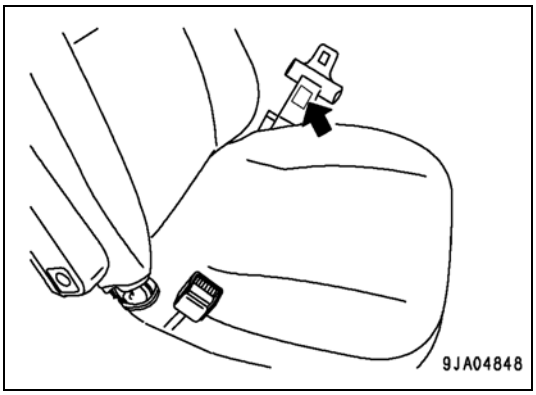
I. Fasten the seat belt around your waist. Once latched, pull the belt back into the retractor with your left hand to snug the belt.

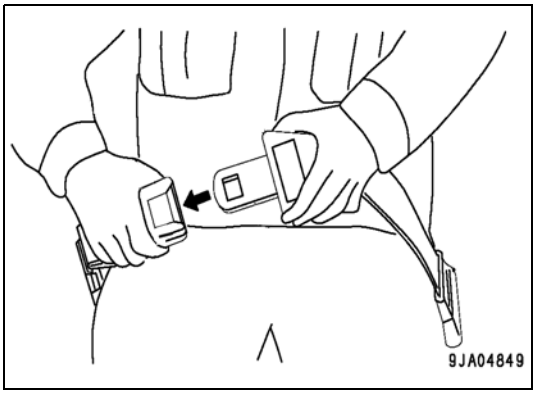
J. Once seated with the seat belt fastened snugly around your waist turn the ignition key to the "ON" position

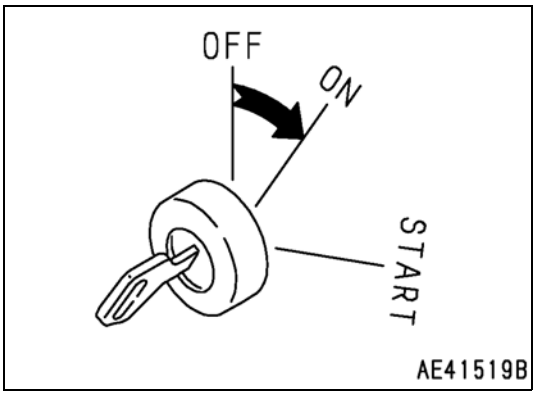
K. Check all the monitors, gauges, and the central warning lamps, be sure they light up for approx. 3 seconds and the alarm buzzer sounds for approx. 1 sec. If the lamps do not light up, there is probably a failure in the system contact your **Komatsu** distributor for inspection.

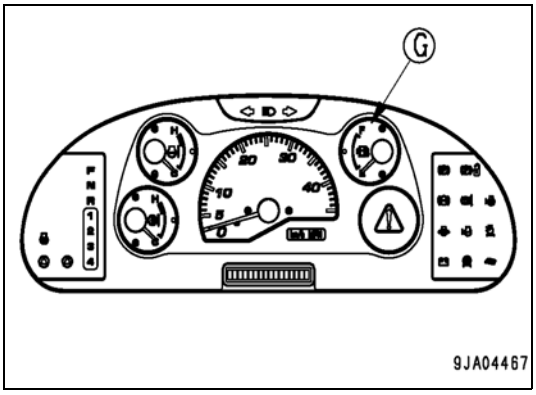
L. Check the fuel tank gauge (G) to be sure the fuel level is not low, if necessary have the machine refueled before operating. Avoid running the machine out of fuel.

M. Adjust the seat to a comfortable position. Be sure you have good visibility and are able to reach all controls and pedals. See "ADJUSTING THE SEAT" on page (2-59)







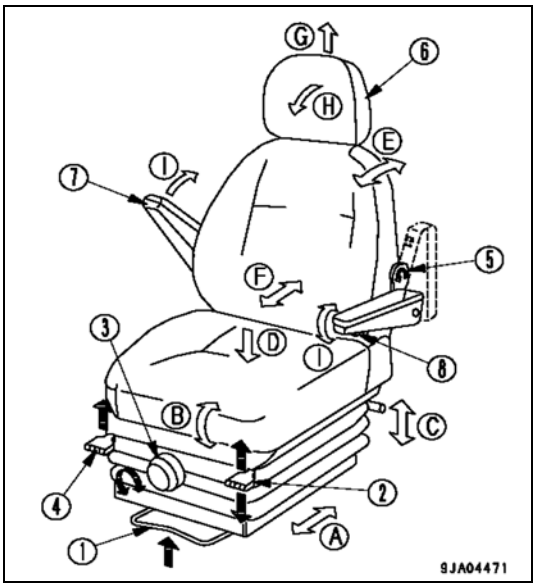


Adjusting The Seat

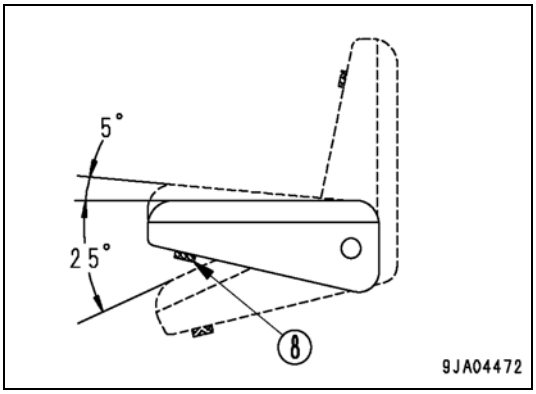
WARNING

When adjusting the seat be sure the safety lock for the controls are set in the locked position to avoid accidental actuation of the controls.

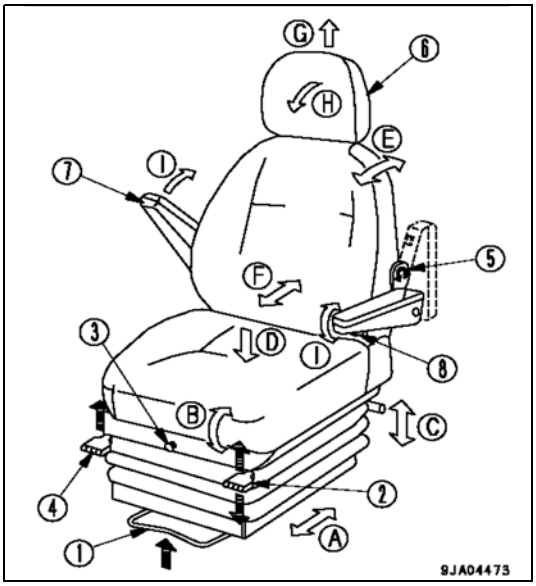
★ **Standard Seat**



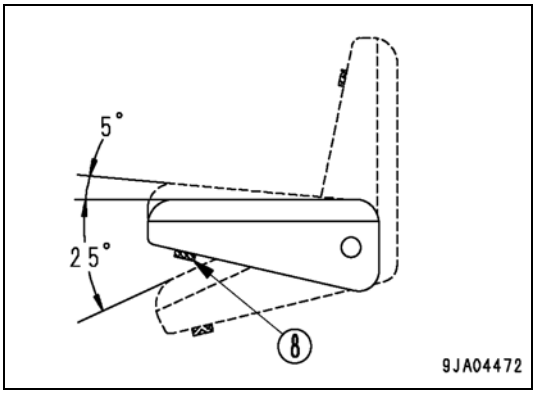
- Fore-and-aft adjustment Pull lever (1) up, set the seat to the desired position, then release the lever. Fore-and-aft adjustment: 120 mm (4.7 in)
- Adjusting seat angle Move lever (2) up and push down on the rear of the seat to tilt it backward. Move lever (2) down and push down on the front of the seat to tilt it forward. Adjustment range: 13 degrees (Tilt forward/tilt back angle)
- Adjusting height of seat Operate lever (2) in the up or down direction to move the seat up or down. These levers are also used for adjusting the seat angle, so adjust the seat angle to set the seat to the desired height. Amount of adjustment: 50 mm (2.0 in)
- Setting seat for weight Turn grip (3) to adjust the strength of the suspension. Adjustment range: (Target) 50 kg to 120 kg (110 to 265 lb)
- Adjusting reclining angle Move lever (4) up and move the backrest to the front or rear. Adjustment range: Front 24 degrees Rear 3 degrees
- Lumbar support Turn grip (5) to adjust the tension applied to the lower back.
- Adjusting headrest height Move the headrest (6) up or down. Amount of adjustment: 50 mm (2.0 in)
- Adjusting headrest angle Rotate the headrest (6) to the front or rear. Adjustment range: 60 degrees
- Adjusting armrest angle Armrest (7) can be operated by hand to spring up approx. 90 degrees (both left and right). In addition, dial (8) under the armrest can be operated by hand to make fine adjustments of the armrest in the up or down direction (left side only). Adjustment range: forward tilt 25 degrees, backward tilt 5 degrees



★ **Air Suspension Seat**



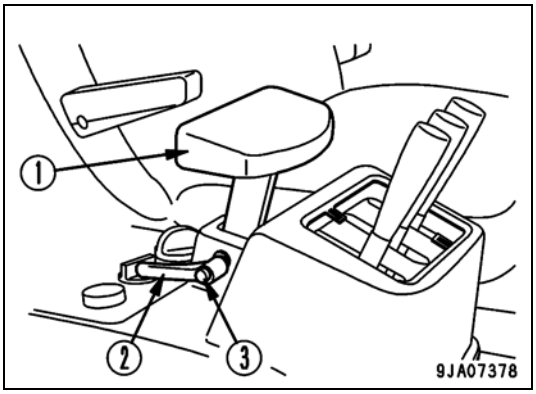
- Fore-and-aft adjustment Pull lever (1) up, set the seat to the desired position, then release the lever. Fore-and-aft adjustment: 120 mm (4.7 in)
- Adjusting seat angle Move lever (2) up and push down on the rear of the seat to tilt it backward. Move lever (2) down and push down on the front of the seat to tilt it forward. Adjustment range: 13 degrees (Tilt forward/tilt back angle)
- Adjusting height of seat Operate lever (2) in the up or down direction to move the seat up or down. These levers are also used for adjusting the seat angle, so adjust the seat angle to set the seat to the desired height. Amount of adjustment: 50 mm (2.0 in)
- Setting seat for weight Knob (3) controls the air suspension system's air valve. Push or pull the knob to adjust the suspension's strength and compensate for operator weight and/or preference.



- Adjusting reclining angle Move lever (4) up and move the backrest to the front or rear. Adjustment range: Front 24 degrees Rear 3 degrees
- Lumbar support Turn grip (5) to adjust the tension applied to the lower back.
- Adjusting headrest height Move the headrest (6) up or down. Amount of adjustment: 50 mm (2.0 in)
- Adjusting headrest angle Rotate the headrest (6) to the front or rear. Adjustment range: 60 degrees
- Adjusting armrest angle Armrest (7) can be operated by hand to spring up approx. 90 degrees (both left and right). In addition, dial (8) under the armrest can be operated by hand to make fine adjustments of the armrest in the up or down direction (left side only). Adjustment range: forward tilt 25 degrees, backward tilt 5degrees

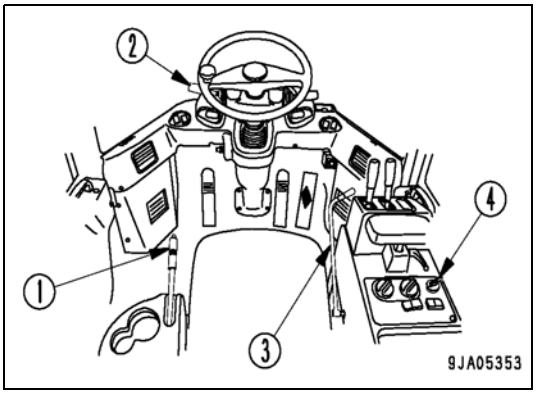
Adjusting The Arm Rest

Adjust height of wrist rest. Loosen lock lever (2) and adjust the height of wrist rest (1). Amount of adjustment: 60 mm (2.4 in) Keep button (3) pressed and operate lock lever (2) to the **FREE** position. The lever can be turned in the desired direction.



START-UP AND CHECKS

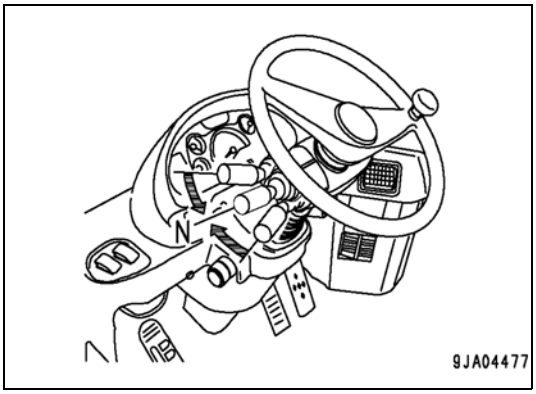
A. Be sure the parking brake (1) is in the locked position and the work equipment lock lever (3) is also in the locked position.



B. Make sure the directional lever (2) is set in the neutral position as the engine will not start with the lever in F or R position.

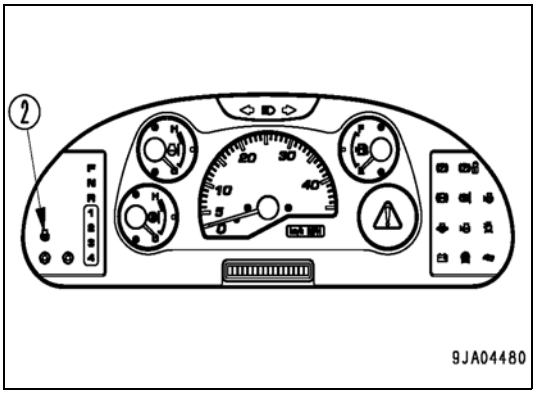
C. Set the speed control switch (4) is set in 1st. speed range.

D. Now you are ready to start the engine. Follow the procedures outlined below for warm and cold weather starts.

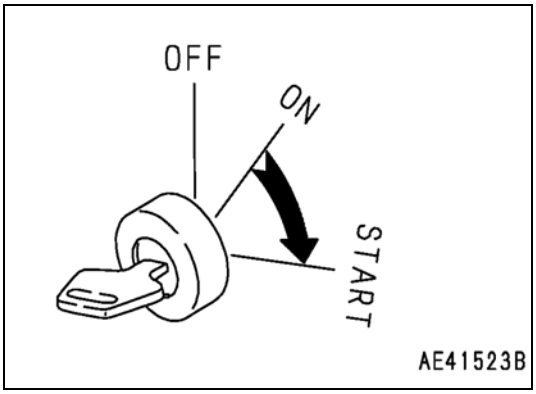


Warm Weather Start-ups

E. With the ignition key in the “ON” position during warm weather the preheat timer (2) may be illuminated for a moment then go out. As soon as this light goes out the engine is ready to start.

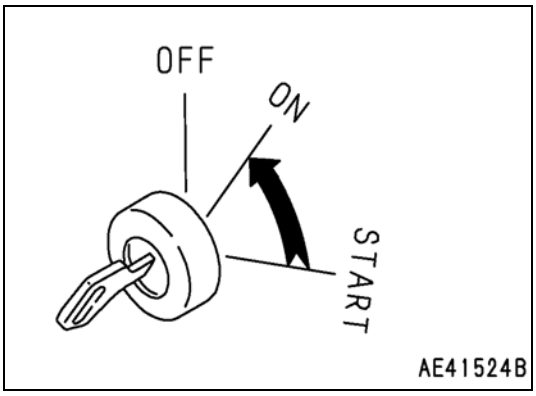


F. Turn the key to the “START” position to crank the engine. Do not depress the accelerator pedal while starting the engine.



G. Once the engine starts, release the key and it will return to the “ON” position.

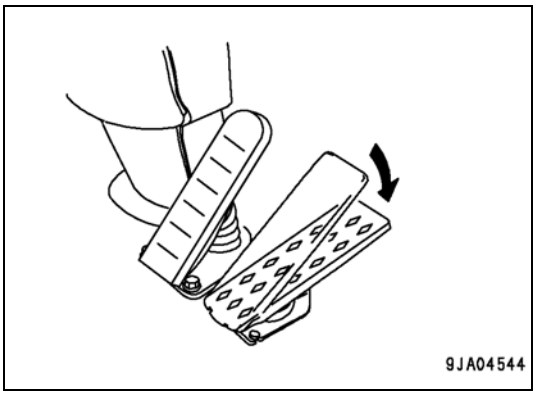
H. Allow the engine to idle at a low RPM until warmed up.



Cold Weather Start-ups

During cold weather the preheat time for the engine will be longer. Below is a chart showing the times of preheating in seconds.

Engine Coolant Temperature ^{0}C (^{0}F)	Preheat Time In Seconds
below -30 (-22)	45
-24 (-13)	38
-20 (-4)	30
-15 (5)	23
-10 (14)	15
-5 (23)	8
0 (32)	1
above 0 (32)	0



I. Once the preheat light (2) goes out depress the accelerator pedal slightly and crank the engine until it starts. If the engine does not start the first time the preheat procedure may need to be repeated. If it continues not to start, contact your **Komatsu** dealer for repairs.

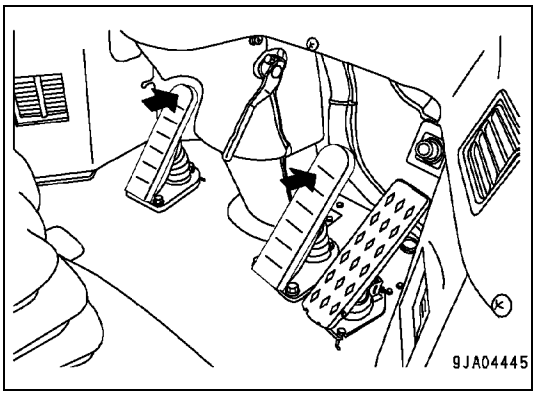
J. Once the engine has started increase the RPM slightly to warm the engine up. Avoid rapped and high speed acceleration, doing so may damage the engine.

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

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

M. Check the brakes and steering wheel. Be sure they are clean and free from dirt or grease.

N. Check the operation of all work controls and pedals.



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.

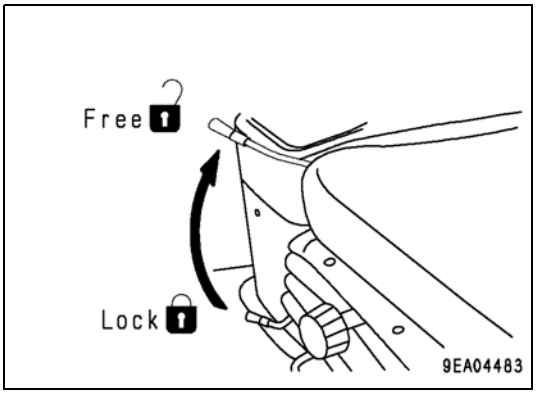
STARTING YOUR WORK OPERATIONS

- 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.
- Check the area to be sure all personnel are clear of the machine and your work area.

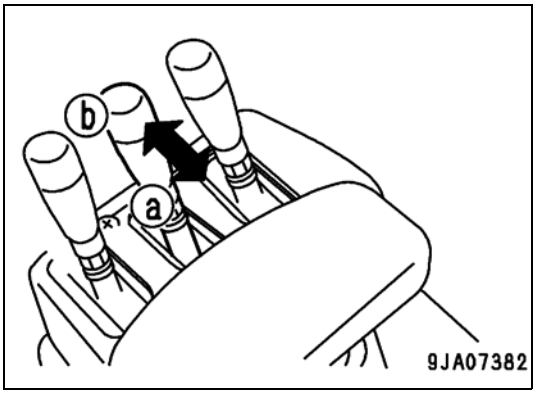
WARMING THE HYDRAULIC OIL

During cold seasons it is advised to warm the hydraulic system up first before operating the machine.

Unlock the control safety lock lever by pulling it all the way up.

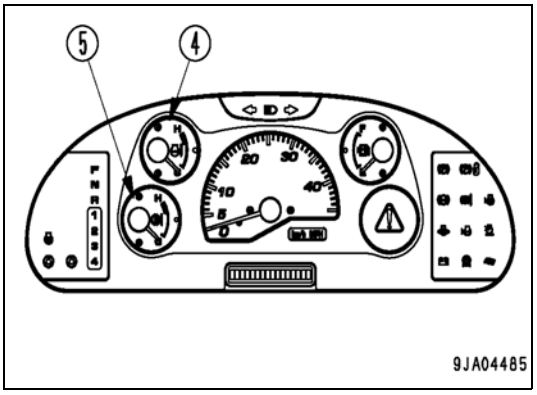


Depress accelerator pedal lightly and run the engine at a mid-range speed. Operate control lever to **TILT** position (a) and return it to **HOLD** position (b) to warm up the hydraulic oil. The relief time at the tilt position (a) should be a maximum of 10 seconds. With this operation, the oil will reach the relief pressure and this will warm up the hydraulic oil more quickly.

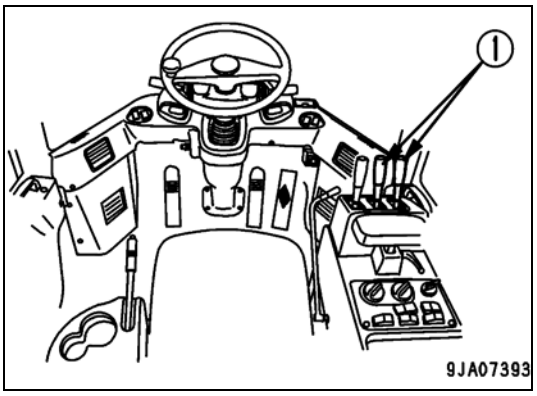


After carrying out the warming-up operation, check that the gauges and lamps to be sure they are normal. If there is any abnormality, carry out maintenance or repair. Run the engine under a light load until engine cooling water temperature gauge (4) and HST oil temperature gauge (5)are in the white range.

Check for any abnormal exhaust gas color, noise or vibration. If any abnormality is found, contact your **Komatsu** distributor.



PARALLEL TOOL KIT



The 6-segment parallelogram-style linkage is designed to keep the attachment level while lifting a variety of materials. The hydraulic Quick Couplers allows the operator the ability to interchange attachments if needed.

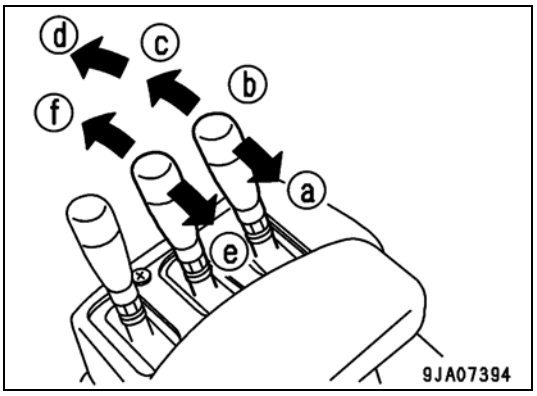
WORK EQUIPMENT CONTROL LEVERS

- Work equipment control levers

  - Use this lever (1) to operate the lift arm and fork.

WARNING

Do not use the FLOAT feature when using the forks kit. Possible injury or damage to machine or load may result



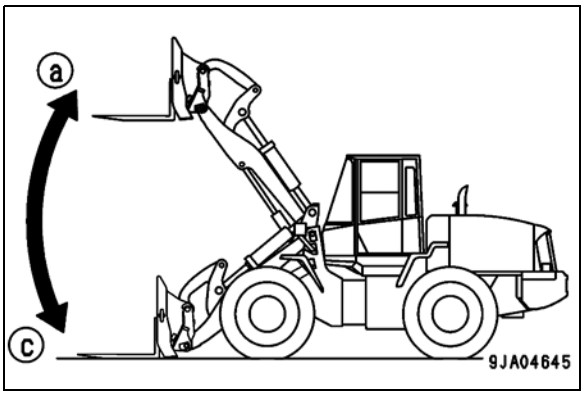
1. Position (a): **RAISE**

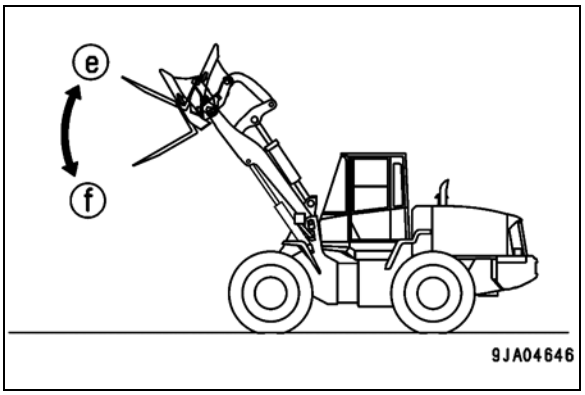
   - When the work equipment control lever is pulled further beyond the **RAISE** position, the lever is stopped in this position until the lift arm reaches the preset position of the kick out, and the lever is returned to the **HOLD** position.
2. Position (b): **HOLD**

   - The lift arm and fork stop and remain in the same position.
3. Position (c): **LOWER**
4. Position (d): **FLOAT (Do not use this feature)**

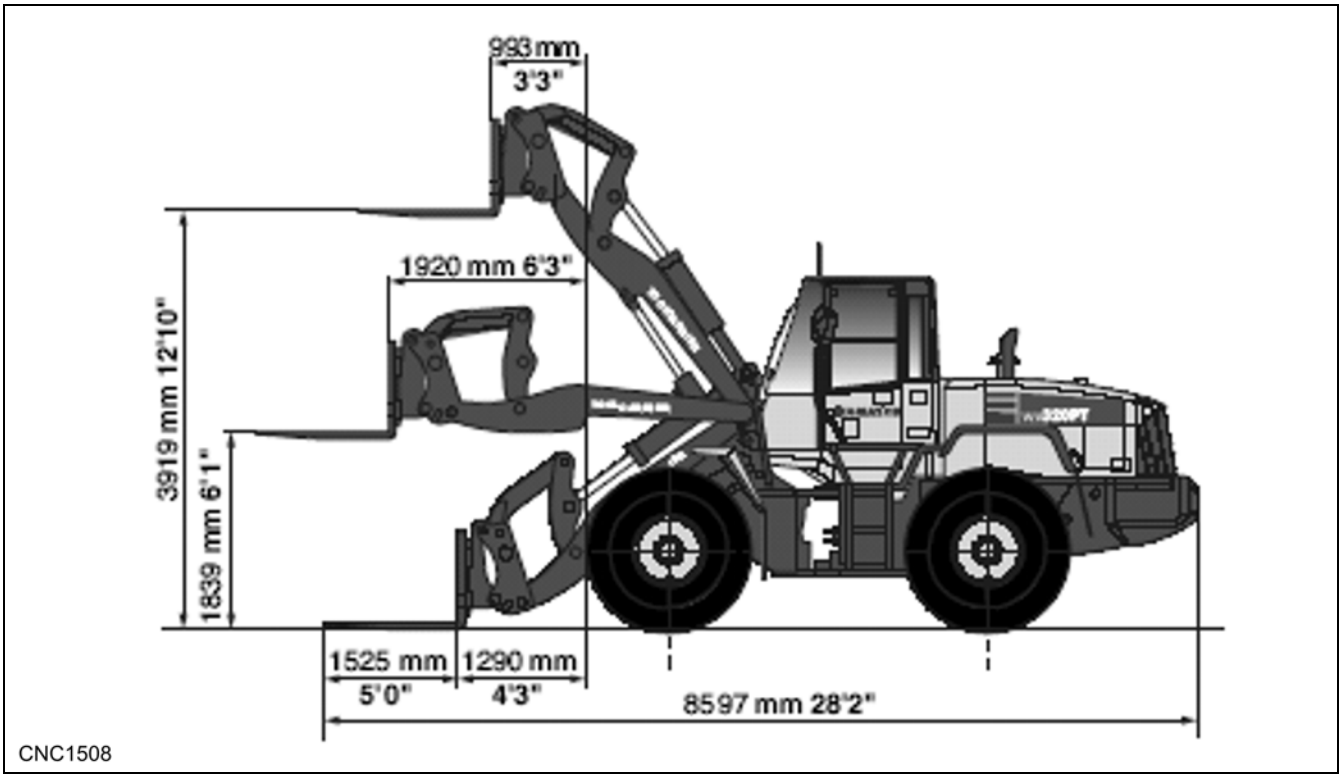
   - The lift arm moves freely under external force.
5. Position (e): **TILT**

   - When the work equipment control lever is pulled further from the **TILT** position, the lever is stopped in this position until the fork reaches the preset position of the positioner, and the lever is returned to the **HOLD** position.
6. Position (f): **DUMP**





USING THE FORKS



FORK LIFT LIMITATIONS

Before handling materials with the forks it is important to understand the limitations of the machine when loaded. Static tipping loads and operating weight shown in the chart below include lubricants, coolant, fuel and machine components. Machine stability and operating weight are affected by the counterweight, tire size, ground conditions and other attachments. Keep in mind the higher you raise a load, the higher you force the center of gravity reducing the stability of the machine.

Static tipping load - boom level **Fork level, 610 mm (24 in)** **Load center**	**Straight**	8290 kg	(18,276 lbs)
	Full turn (40°)	7212 kg	(15,899 lbs)
Operating weight		14588 kg	(32,161 lbs)
Fork tine length		1525 mm	(60 in)
Ground to top of tine at maximum lift		3919 mm	(12 ft/10 in)
Reach at maximum lift		993 mm	(3 ft/ 3 in)
Ground to top of tine - boom and tine level		1839 mm	(6 ft/1 in)
Reach boom and tine level		1920 mm	(6 ft/ 3 in)
Overall length - tine level on ground		8597 mm	(28 ft/ 2 in)
Operating load		3606 kg	(7,950 lbs)

LOAD HANDLING SAFETY TIPS

★ The following explanation of the method of operating the forklift does not cover all situations. The operating method differs according to each operating condition. When operating the forklift, use the safest and most efficient method.

★ The operating speed of the forklift is determined according to the configuration of the ground, condition under foot, and size of the operating area. Always travel at a safe controllable speed.

★ Be aware of the fork tip protrusion when handling a load, damage to materials in front of your load may result if not careful when placing materials back to back.

★ When operating the forklift, maintain the engine speed at near full speed, and carry out the operation with the speed range in 1st or 2nd. Use 3rd or 4th speed when traveling without a load.

TRAVELING SAFETY TIPS

★ When traveling with a load, do not turn suddenly or accelerate or decelerate suddenly. There is danger that the load will fall off or the machine or may cause a rollover situation. Travel with the load no higher than 305 mm (12 in) off the ground and tilted back slightly.

★ Never raise a load while traveling, always stop to raise a load and proceed cautiously.

★ The fork tilt angle differs according to the load. If loads are stacked on top of each other, and the tilt angle is excessive, there is danger that the top load will extend over the backrest of the carriage and slip to the rear.

★ When traveling with out a load, travel with the forks 305 mm (12 in) off the ground.

LOADING OPERATIONS

1. Adjust the distance between the forks to match the size of the load.

2. Drive slowly toward the load with the forks 305 mm (12 in.) off the ground, when with in 152 mm (6 in.) of the load raise the forks up to the proper height to pick up the material.

    • To ensure the stability of the load, set the distance between the forks as wide as possible. Be sure the load is centered on the forks.

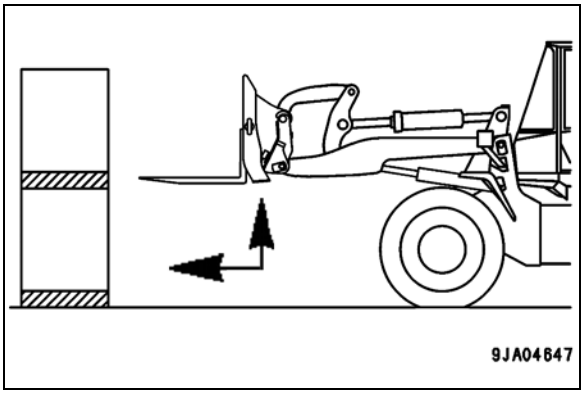
3. Roll the carriage forward so the forks are level with the load. Carefully approach the load.

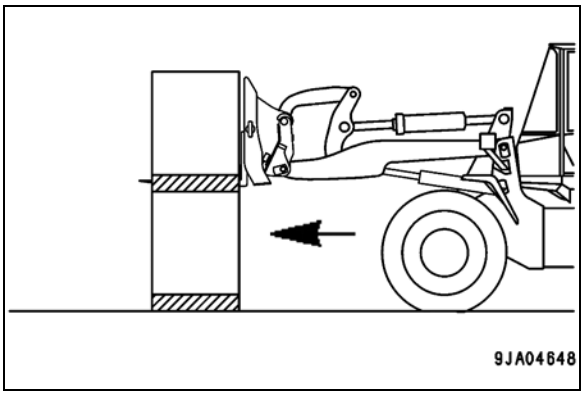
4. Drive into the load until the material is touching the load back rest on the carriage.

Remark

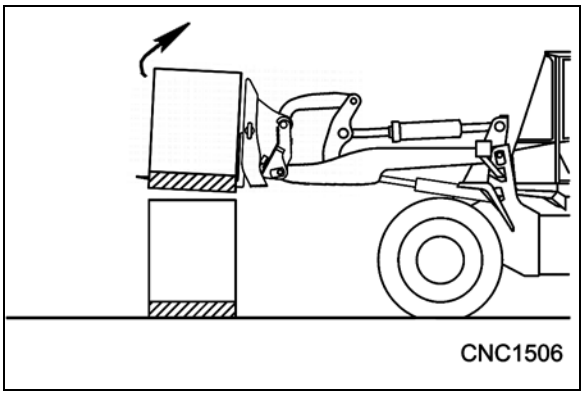
Always be aware of the fork tip protrusion when entering a load, the fork tips may damage material stacked behind the load you are picking up

5. Once in the load, raise the forks so the load just touches the top surface of the forks,

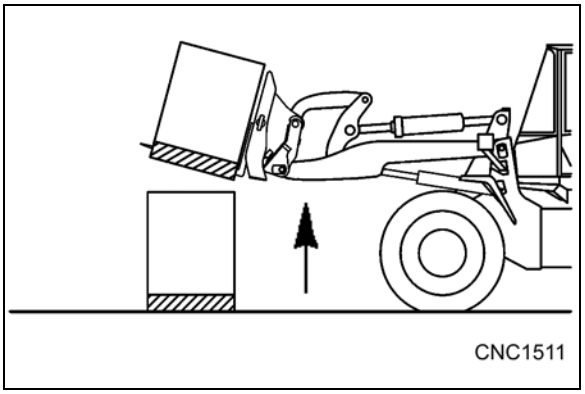




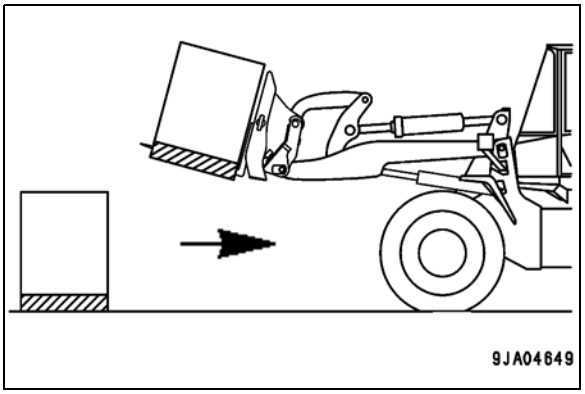
6. Carefully tilt the forks back slightly so that the load rests against the backrest of the carriage.



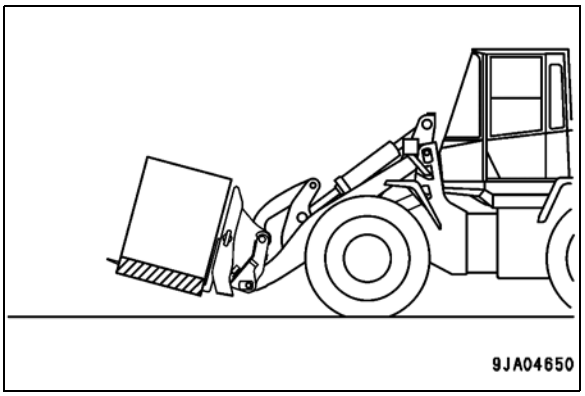
7. Raise the load slightly to clear the surface you are removing it from.



5. Check that there are no obstacle behind the machine, then drive the machine slowly in reverse until the load is over an area where it can be lowered.



6. Stop, lower the load until it is close to the ground 305 mm (12 in) from the ground surface.



TRANSPORTING A LOAD

- When traveling with a load, do not turn suddenly or accelerate or decelerate suddenly. There is a danger the load will fall off or the machine could rollover.
- The fork tilt angle differs according to the load. If loads are stacked on top of each other, and the tilt angle is excessive, there is a danger the top load will extend over the backrest of the carriage and slip on to the rear loader arms or wheels.

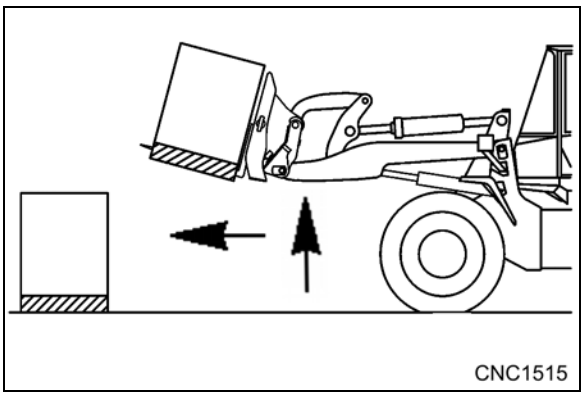
- Keep the load near the ground surface 305 mm (12 in) when transporting.
- When transporting a load, carry out the operation with the speed range in 1st or 2nd.
- Use 3rd or 4th speed when traveling without a load.
- The travel speed when transporting differs according to the conditions. Always travel at a safe controllable speed that ensures safety. When transporting on rough ground or slopes, travel at low speed.
- When transporting on slopes, travel with the load on the uphill side.
- If the load obstructs the view to the front, travel facing in reverse.

UNLOADING

1. Approach the drop site slowly and stop when 152 mm (6 in) in front of your drop area.

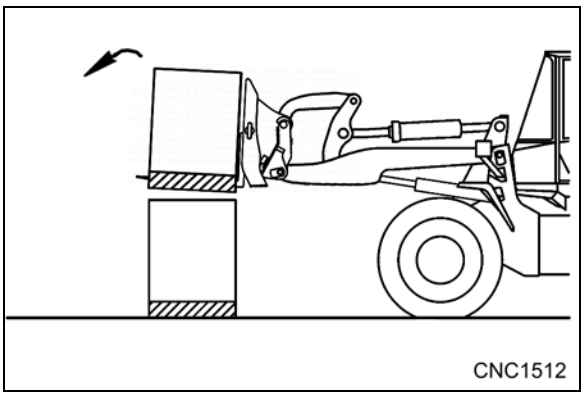
Remark

Be aware of the fork tip protrusion when setting a load, the fork tips may damage material stacked behind the load you are placing

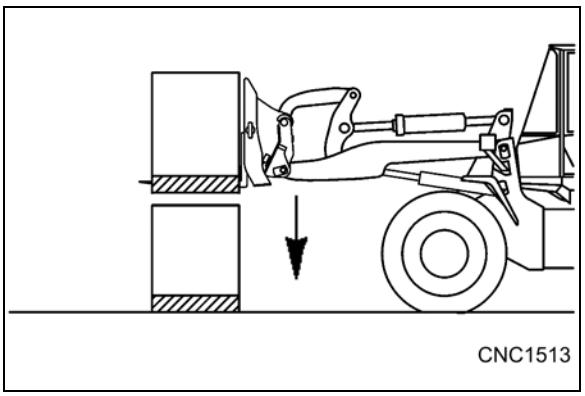


2. With the load in line of the drop zone, raise it above the surface you intend to place it and proceed slowly and cautiously.

3. Once over the drop area, stop and roll the carriage forward until it is level with the surface.

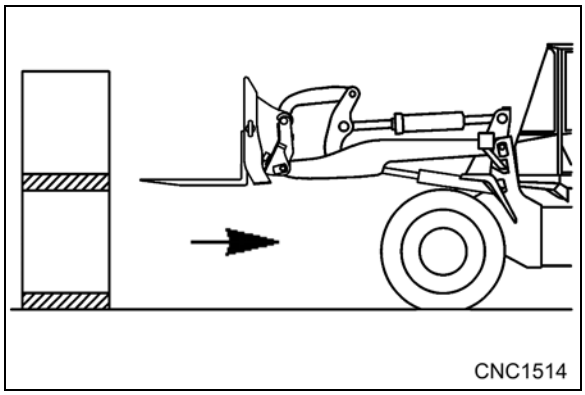


4. Lower the load carefully onto the stack or drop area.



5. Drive the machine slowly in reverse and remove the forks from the load.

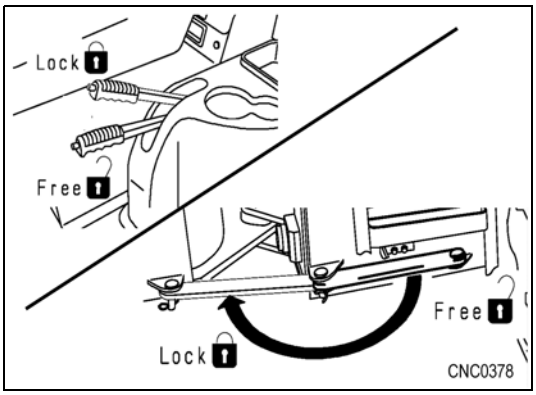
6. Lower the forks.



ADJUSTING THE WORK EQUIPMENT

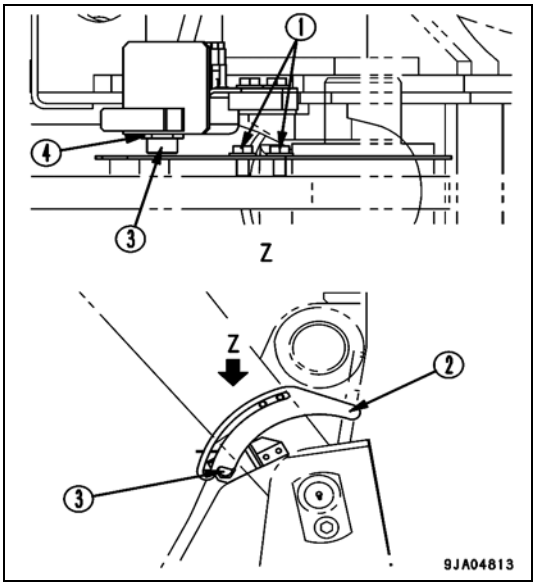
The boom kick out makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal) and the bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle. The setting can be adjusted to match the working conditions.

Basic Precautions



- Stop the machine on flat ground and put blocks in front and behind the wheels.
- Set parking brake lever to the **LOCK** position.
- Secure the front and rear frames with the safety bar.
- Always attach the warning tag to the work equipment control lever.
- Do not go under the work equipment when the arm is raised. To support the work equipment securely, use the proper support that can withstand the weight of the work equipment and prevent the arm coming from down.

ADJUSTING THE BOOM KICKOUT



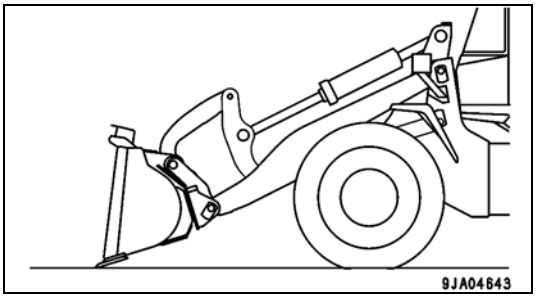
1. Raise the bucket to the desired height, set the lift arm control lever at **HOLD**, then set the safety lever to the **LOCK** position and stop the engine.

2. Loosen two bolts (1), and adjust plate (2) so that the bottom edge is in line with the center of the sensing surface of proximity switch (3). Then tighten the bolts to hold the plate in position.

3. Loosen two nuts (4) to make a clearance of 3 to 5 mm (0.118 to 0.197 in) between plate (2) and the sensing surface of proximity switch (3). Then tighten the nuts to hold in position. Tightening torque: 14.7 to 19.6 N²m (1.5 to 2.0 kgf²m, 10.8 to14.5 lbft)

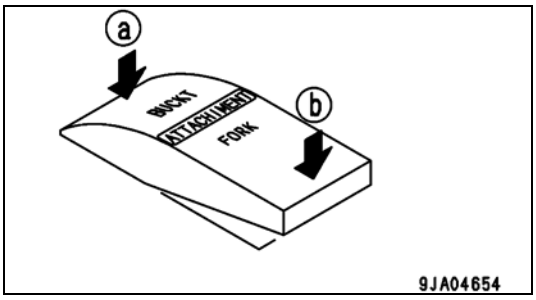
4. After adjusting, start the engine and operate the lift arm control lever. Check that the lever is automatically returned to **HOLD** when the bucket reaches the desired height.

ADJUSTING THE BUCKET POSITIONER



1. Lower the bucket to the ground, set to the desired digging angle, return the bucket control lever at **HOLD**, then set the safety lever to the **LOCK** position and stop the engine.

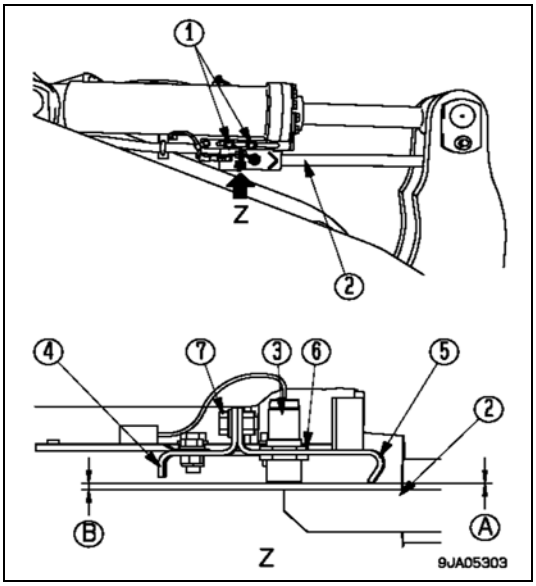
2. Set the attachment selector switch to bucket position (a)



3. Loosen 2 bolts (1), adjust the position of mounting bracket (4) of the proximity switch so that the rear tip of bar (2) is in line with the center of the sensing surface of proximity switch (3), then tighten bolts to hold the bracket in position.

4. Loosen 2 nuts (6), adjust so that clearance (A) between support (5) and the sensing surface of proximity switch (3) is 0.5 to 1.0 mm (0.020 to 0.039 in), then tighten the nuts to hold in position. Tightening torque: 14.7 to 19.6 N²m (10.8 to14.5 lbft)

5. Loosen 2 bolts (7), adjust so that clearance (B) between bar (2) and the sensing surface of proximity switch (3) is 3 to 5 mm (0.118 to 0.197 in), then tighten the bolts to hold in position. 5. After adjusting, start the engine and raise the lift arm.
Operate the bucket control lever to the **DUMP** position, then operate it to the **TILT BACK** position and check that the lever is automatically returned to the **HOLD** position when the bucket reaches the desired digging angle.

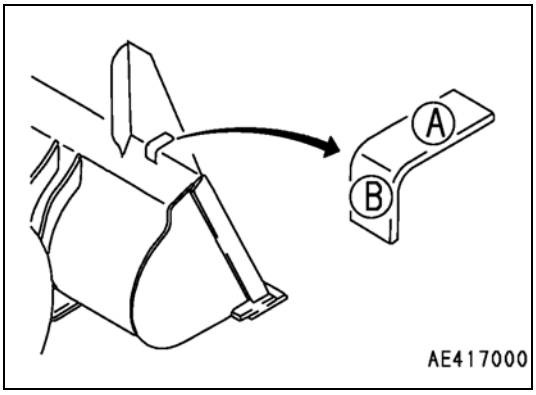


BUCKET LEVEL INDICATOR

(A) and (B) at the top rear of the bucket are the level indicators, so the bucket angle can be checked during operations.

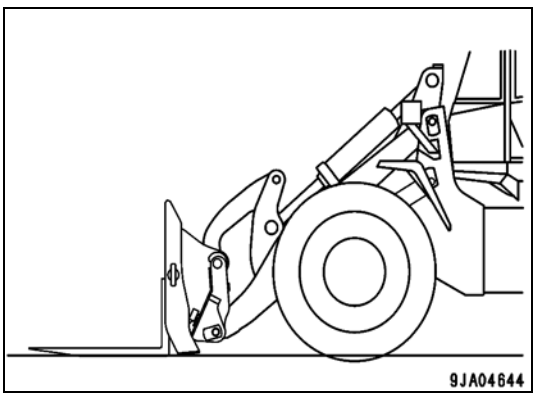
(A): Parallel with cutting edge

(B): 90 degrees to cutting edge

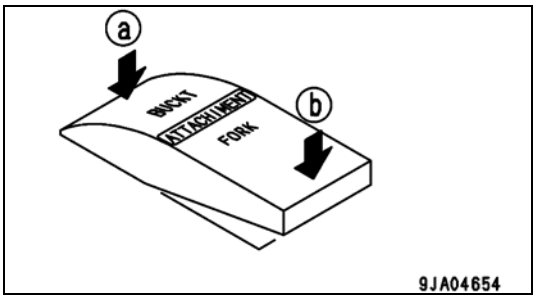


ADJUSTING FORK POSITIONER

1. Lower the forks to the ground, set to the horizontal position, return the work equipment control lever to the **HOLD** position, then set the work equipment lock lever to the **LOCK** position and stop the engine.



2. Set the attachment selector switch to fork position (b).

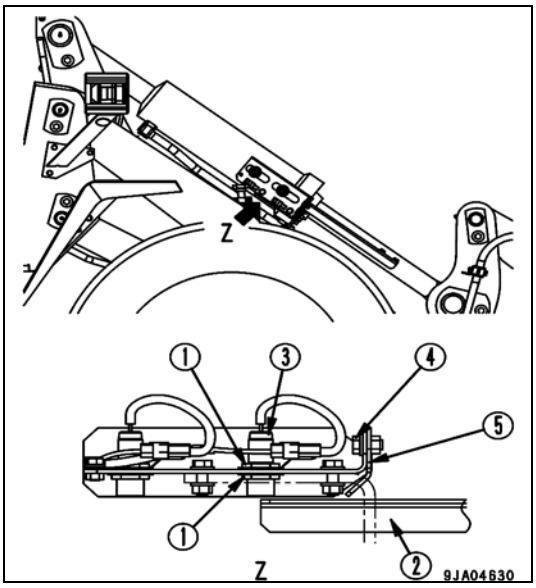


3. Loosen nut (1), then adjust the position of the proximity switch so that the rear tip of bar (2) is in line with the center of the sensing surface of proximity switch (3).

4. Adjust nut (1) so that the clearance between bar (2) and the sensing surface of proximity switch (3) is 3 to 5 mm, then tighten the nut to hold in position. Tightening torque: 14.7 to 19.6 N·m (10.8 to 14.5 lbft)

5. Loosen bolt (4) and adjust so that the tip of protector (5) extends 0.5 to 1.0 mm from the sensing surface of proximity switch (3), then tighten the bolt to hold in position.

6. After adjusting, start the engine, and raise the lift arm. Dump the fork, then tilt back and check that the lever returns automatically to the **HOLD** position when the fork is horizontal.

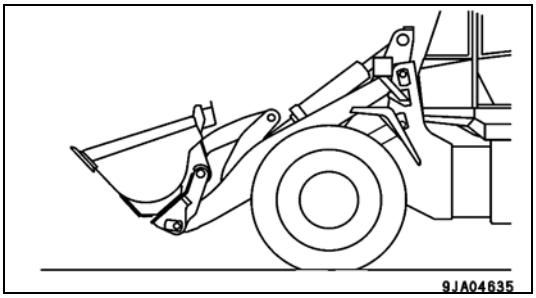


USING THE HYDRAULIC QUICK COUPLER

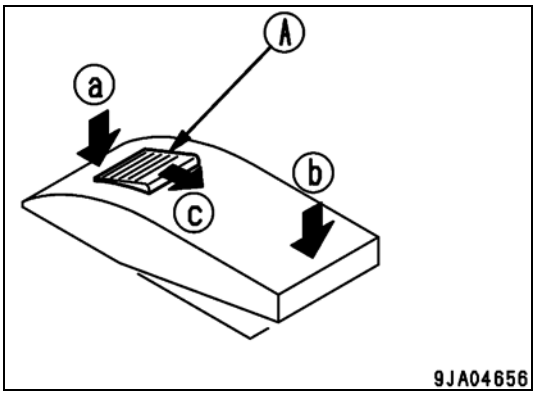
Before operating the machine, check to be sure the attachment is correctly connected. If it is not correctly installed, the attachment may fall off and cause serious injury. Check that the quick coupler attachment switch is at the **CONNECT** position. Check that the coupler plunger is completely inserted into the attachment.

REMOVING THE ATTACHMENT

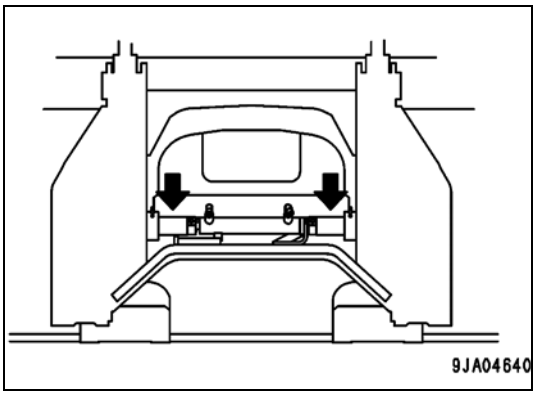
1. Tilt the attachment.



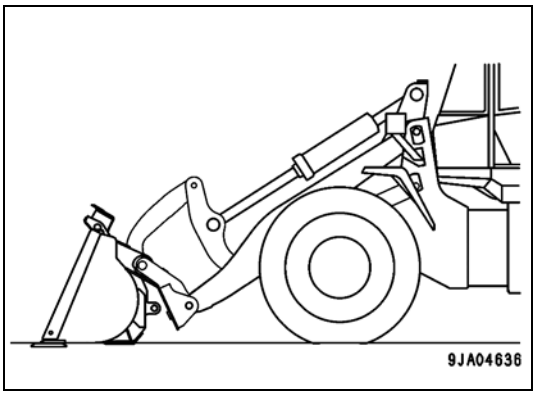
2. Keep the bucket control lever at the **TILT** position, pull lock (A) of the quick coupler attachment switch in the direction of the arrow (c), and push in to **RELEASE** position (a) to release the connection.



3. Check that the coupler plunger is completely pulled in.

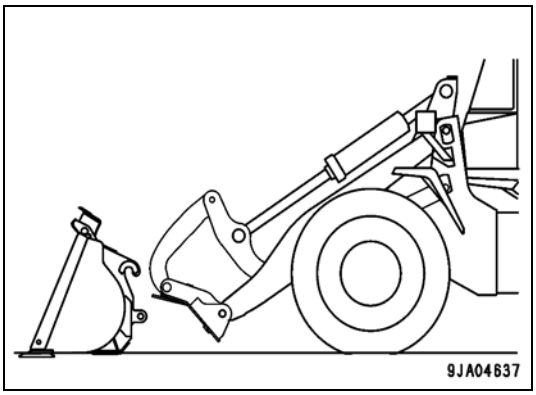


4. Lower the attachment completely to the ground and set it in a stable position.

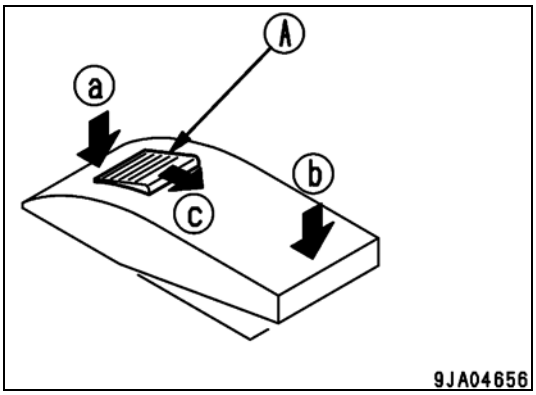


5. Tilt the coupler forward slowly and lower it slowly so that it separates from the attachment hook.

6. Drive the machine slowly in reverse and separate the attachment from the machine.

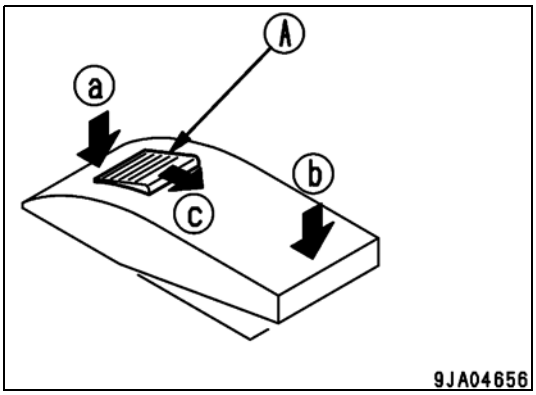


7. Push in the quick coupler attachment switch to CONNECT position (b).

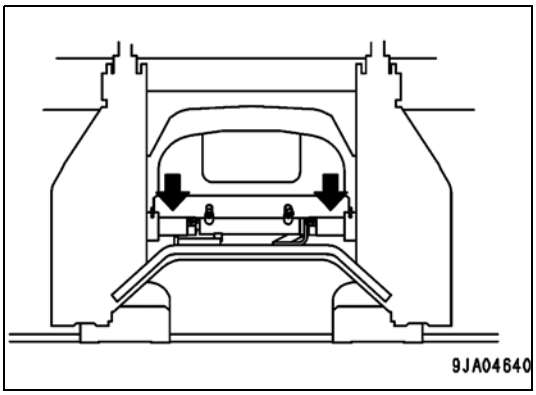


INSTALLING THE ATTACHMENT

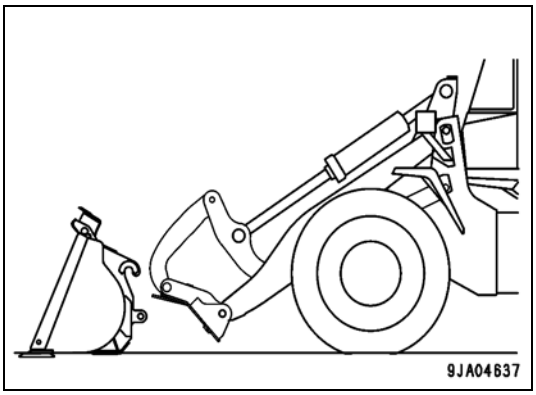
1. Pull lock (A) of the quick coupler attachment switch in the direction of the arrow (c), and push in to RELEASE position (a).



2. Check that the coupler plunger is completely pulled in.

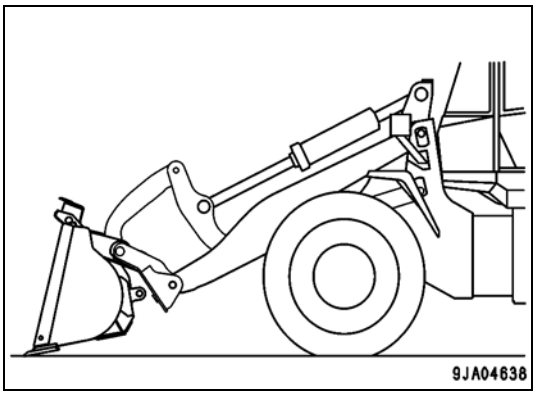


3. Tilt the coupler forward, drive the machine slowly forward and set so that the attachment hook is aligned with the puller tube.

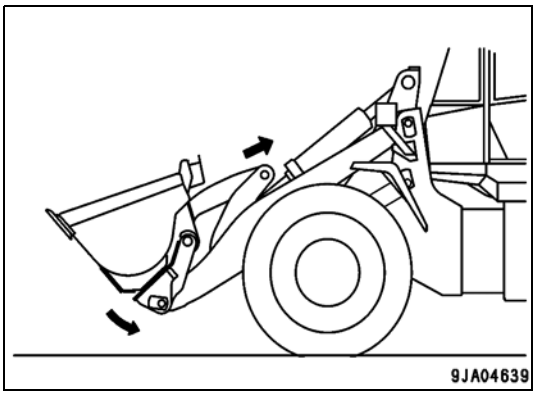


4. Raise the coupler slowly, connect the coupler tube to the attachment hook, then raise the coupler until the attachment rises slightly off the ground.

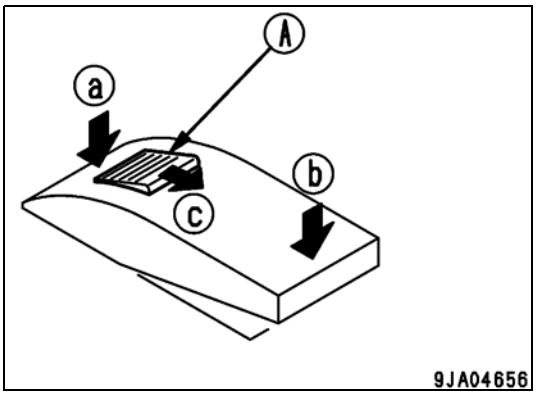
5. Check that the attachment is horizontal to the left and right and that each hook is correctly inserted.



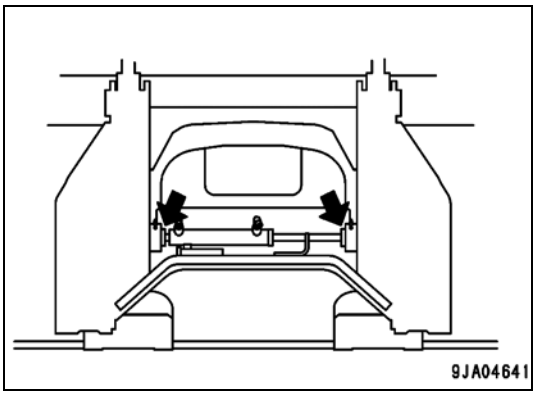
6. Tilt the coupler fully.



7. Keep the bucket control lever at the **TILT** position, and push in the quick coupler attachment switch to **CONNECT** position (b).



8. Check that the coupler plunger is completely inserted.



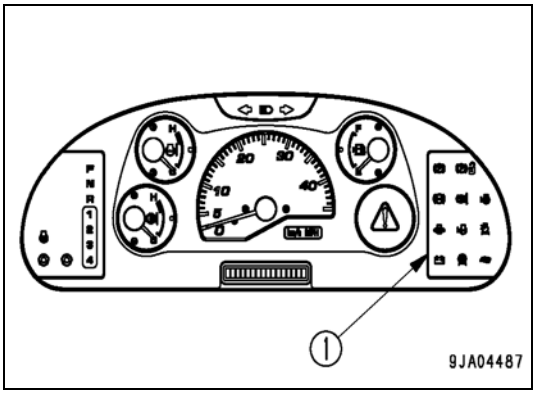
TRAVELING, STOPPING AND PARKING THE MACHINE

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.

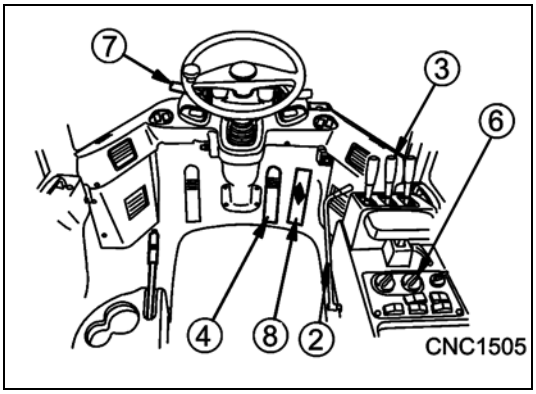
TRAVELING

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.

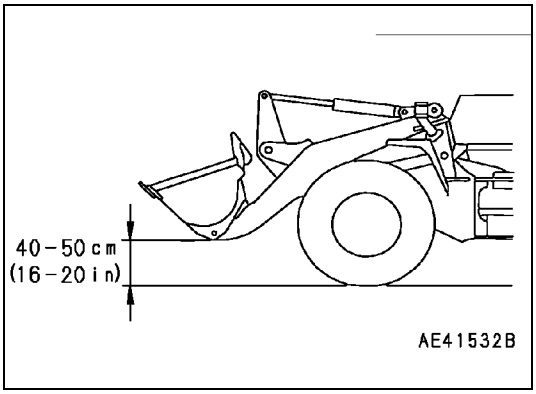
1. Check to be sure the caution lamp (1) is not illuminated.



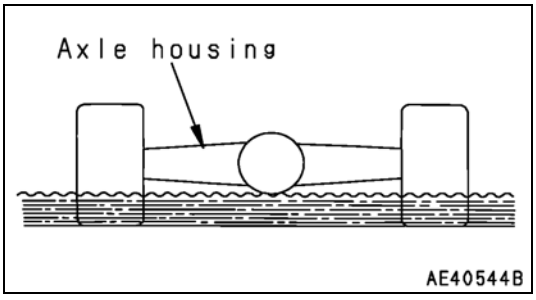
2. Set the work equipment control lever in the **HOLD** position, then move the safety lock lever (2) to the **FREE** position.



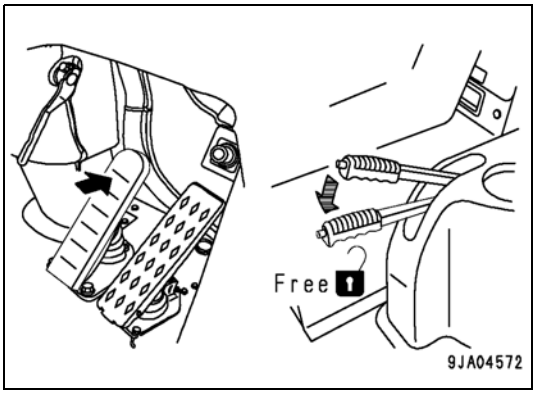
3. Operate lift arm control lever (3) to raise the work equipment to the travel posture shown in the diagram on the right.



4. If the machine must be driven through water be extra careful as to not let the water depth come above the axle housing. After the machine has been driven through water always drain and refill the axle with fresh dry lubricant.



5. Depress brake pedal and release the parking brake lever. At his point keep brake pedal depressed.

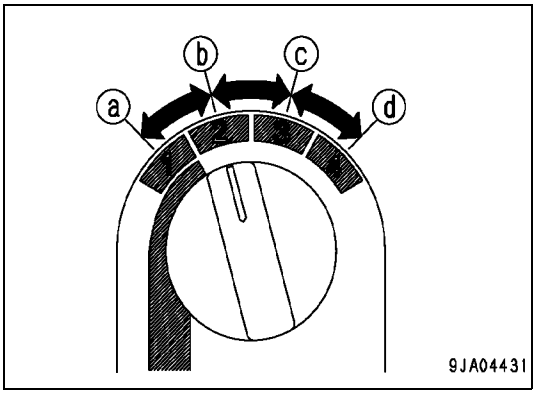


6. Set speed range selector switch to the desired position.

Position (a): **1st**
Position (b): **2nd**
Position (c): **3rd**
Position (d): **4th**

Remark

1st. and 2nd. speed ranges are for work site travel. For road travel it is advised to use 3rd. or 4th. speed ranges.

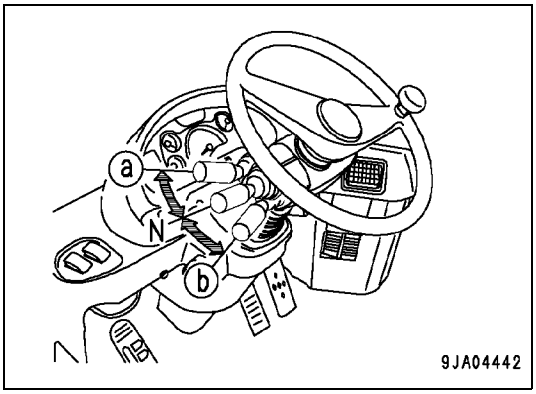


7. Set directional lever to the desired position.

Position (a): **FORWARD**
Position N: **NEUTRAL**
Position (b): **REVERSE**

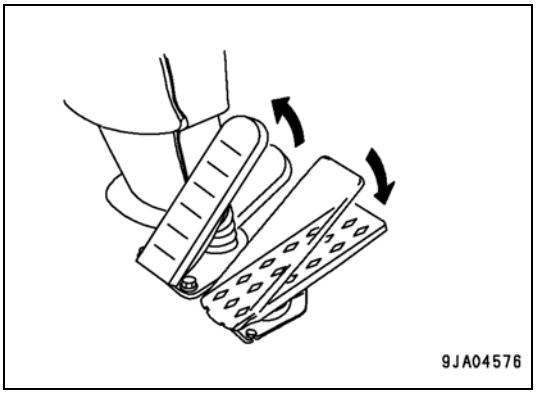
Remark

Do not attempt to operate the machine in reverse using the 3rd. or 4th. speed ranges.

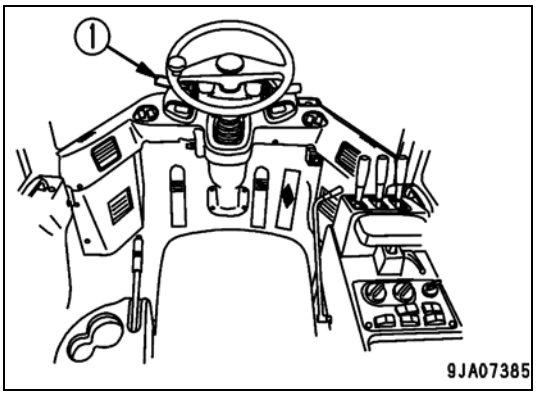


8. Be sure the backup alarm sounds when the directional lever is in the **REVERSE** mode. If the backup alarm does not sound, contact your **Komatsu** distributor for repairs.

9. Release brake pedal, then depress accelerator pedal to start the machine moving.



CHANGING DIRECTION



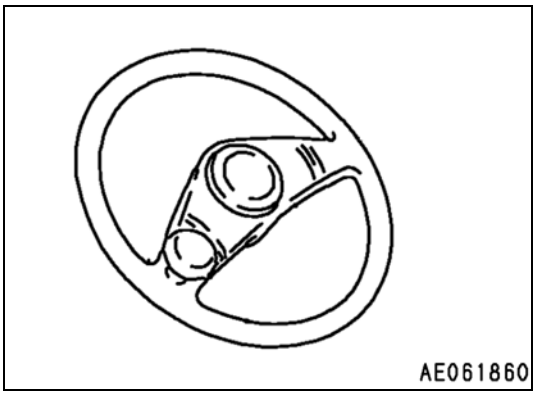
- When changing direction between **FORWARD** and **REVERSE**, be sure the direction of travel you will be using is safe. and there are no blind spot behind or beside the machine, be aseptically careful when changing direction to travel in reverse.
- Do not switch between **FORWARD** and **REVERSE** when traveling at high speeds. Always bring the machine to a full stop or slow down before changing direction.
- When switching between **FORWARD** and **REVERSE**, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max.speed for changing direction: 13 km/h (8.1 MPH))

TURNING THE MACHINE

⚠ WARNING

- **Turning the steering wheel suddenly at high speed or turning on steep slopes is dangerous. Do not turn the steering wheel in such situations.**
- **If the engine stops when the machine is traveling, the steering force will become heavy, so never stop the engine while traveling.**
- **It is particularly dangerous if the engine stops when the machine is traveling on slopes, never let the engine stop when traveling on slopes.**
- **If the engine should stop suddenly, stop the machine immediately in a safe place.**

When traveling, and turning the machine. Keep in mind the front frame is joined to the rear frame at the center of the machine by the center pin. Therefore, the front and rear frames bend at this point, and the rear wheels follow in the same track as the front wheels when turning. When turning, turn the steering wheel carefully to follow the machine as it turns.

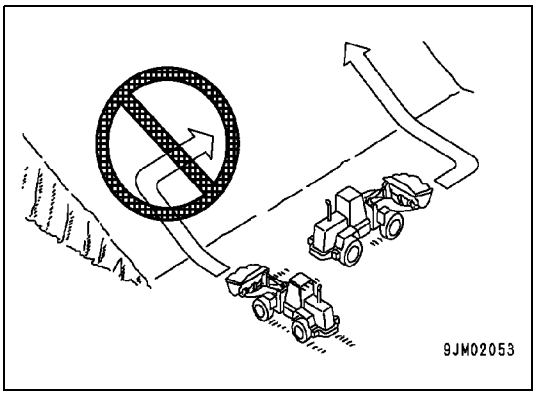


Remark

When the steering wheel reaches the end of its stroke, do not try to turn it any further. Check the play it should be 50 to 100 mm (2.0 to 3.9 in) in the steering wheel. If any abnormality is found, contact your Komatsu dealer for inspection.

TURNING ON SLOPES

Traveling on slopes is dangerous in general. However, turning on a slope can be fatal. When traveling on a slope never turn the steering wheel. Always travel straight up or straight down a slope. If the machine should start to tip, lower the bucket to the ground immediately to stabilize the machine. Travel at a slow pace in the lower speed ranges, avoid dragging the brakes when traveling down a slope.

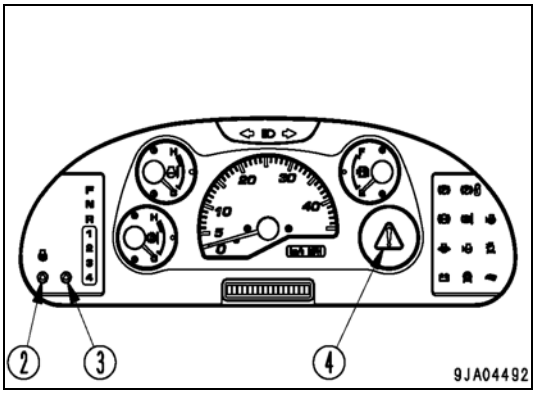


EMERGENCY STEERING (IF EQUIPPED)

WARNING

Never actuate the emergency steering except during emergencies or when checking the function. When using the emergency steering, travel at a speed of less than 5 km/h (3.1 MPH).

Emergency steering lamp (green) (2) lights up to inform the operator that the emergency steering system is working normal.



The emergency steering system is provided to enable the machine to be steered under the following conditions.

- Traveling when there is a failure in the steering system
- Coasting with the engine stopped

Remark

The emergency steering does not work when the machine is stopped.

When the emergency steering system detects a lack of oil pressure in the steering system, the steering oil pressure caution lamp (red) (3) and central warning lamp (4) light up, and the alarm buzzer sounds intermittently.

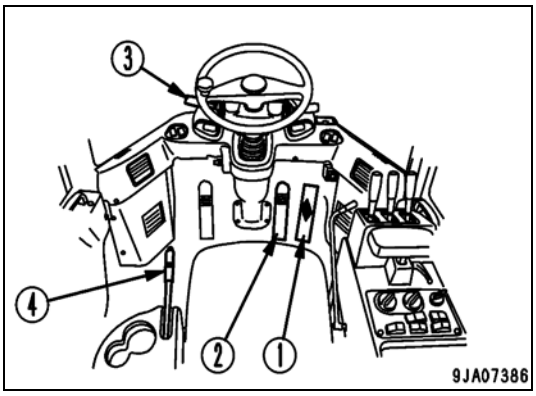
Steering oil pressure caution lamp (red) (3) lights up to inform the operator that there is a failure in the steering system. If steering oil pressure caution lamp (red) (3) lights up, move the machine immediately to a safe place and stop it. Locate the cause and do not operate the machine until it has been repaired.

Remark

If any function of the oil pressure system is used when the engine is running at low speed, steering oil pressure caution lamp (red) (3) may light up for a moment, but if the lamp goes out again, there is no problem.

When the emergency steering system detects that the oil pressure in the steering circuit has been restored, the actuation of the emergency steering system is stopped.

STOPPING THE MACHINE



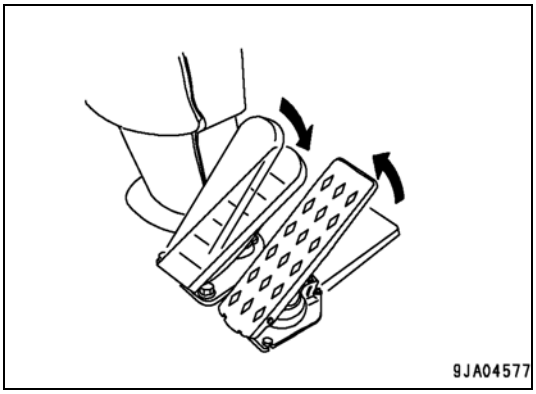
WARNING

- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **Even if the parking brake lever is in the LOCK position, there is a danger the machine may move until the parking brake lamp lights up, keep the brake pedal depressed.**

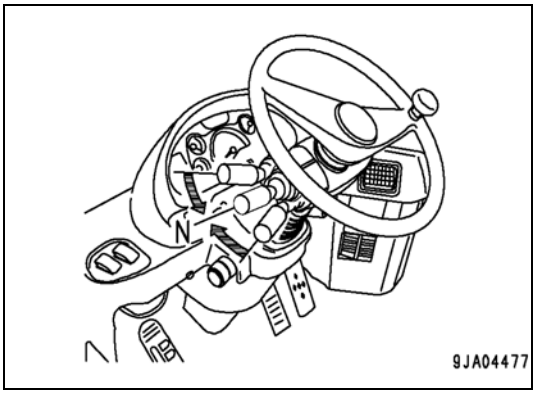
Remark

Never use the parking brake to stop the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.

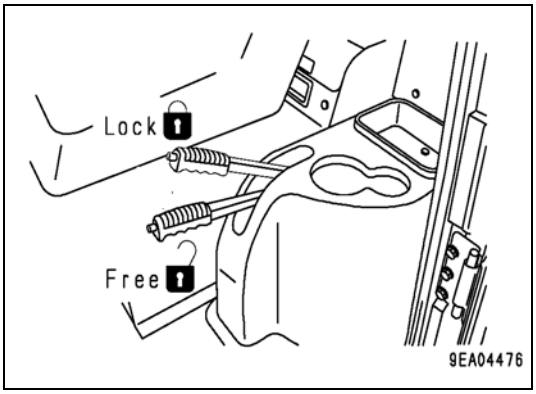
1. Release accelerator pedal (1), then depress brake pedal (2) to stop the machine.



2. Place directional lever (3) in **N** (neutral) position.

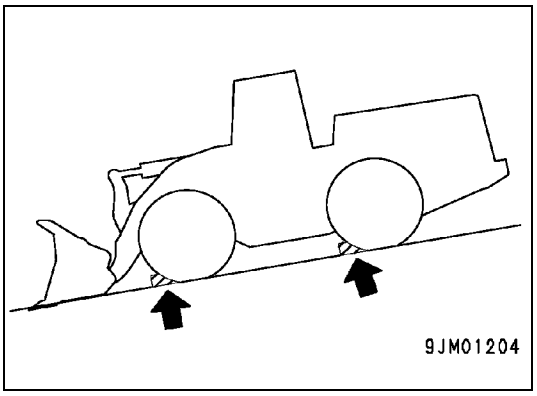


3. Pull parking brake lever (4) and set it to the **LOCK** position to apply the parking brake.

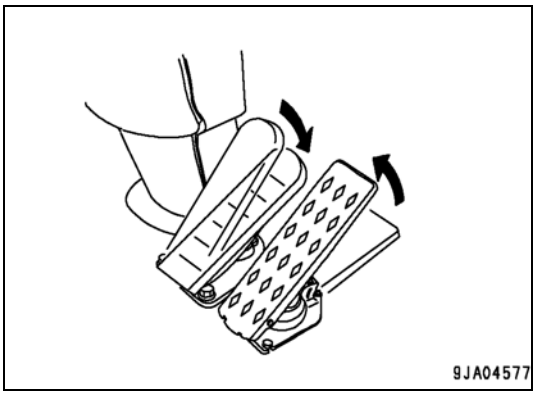


PARKING THE MACHINE

1. Do not park the machine on slopes. If the machine has to be parked on a slope, set it facing directly down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.



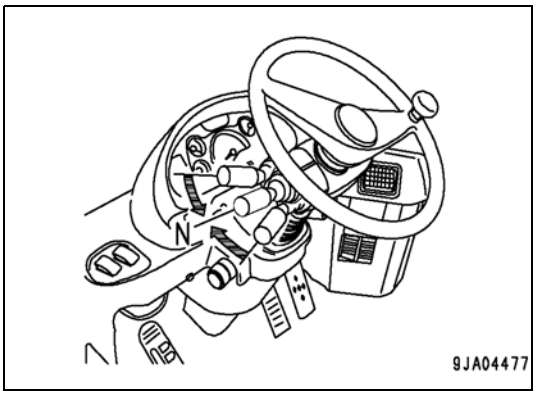
2. Release the accelerator pedal, then depress brake pedal to stop the machine.



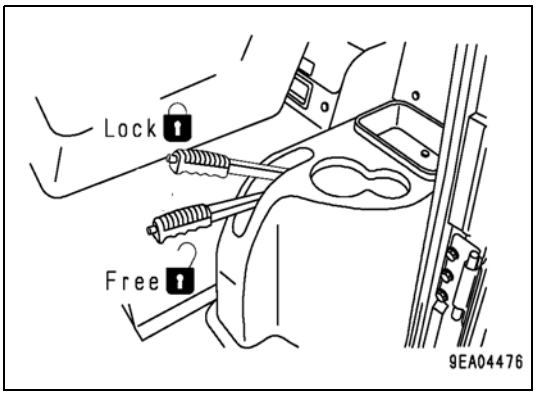
3. Place directional lever in **N** (neutral) position.

Remark

Leaving the directional lever in F or R will not hold the machine in place, the parking brake must be set to hold the machine.

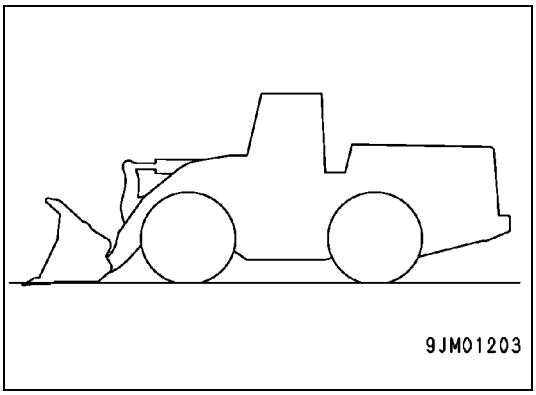


4. Pull parking brake lever to the **LOCK** position.

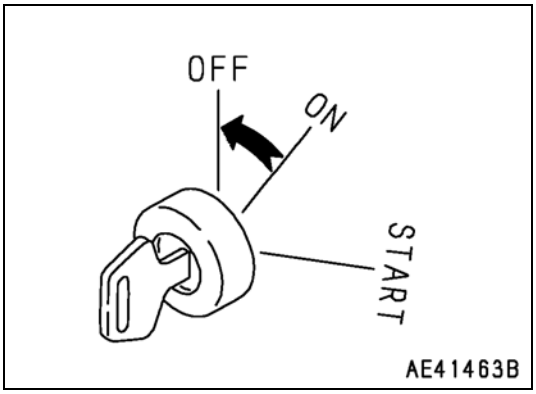


5. Lower the lift arm and bucket to the ground.

6. Set safety lock lever to the **LOCK** position.



7. Allow the engine to run at a low idle for about 5 minutes to cool down gradually. Never shut down an engine that is over heating or has just finished work operations always allow it a time to cool down before turning the ignition key to the “OFF” position.

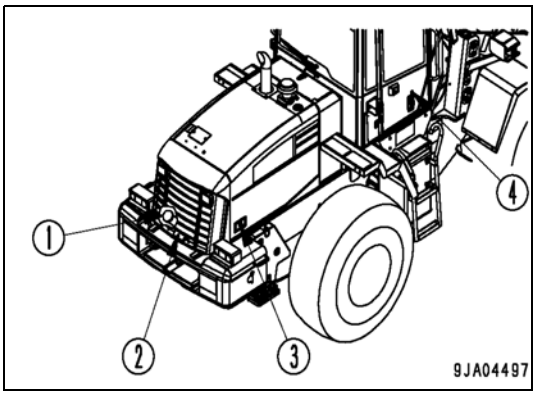


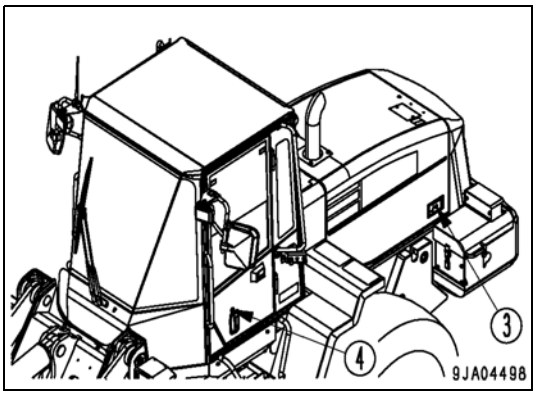
8. Always lock the following areas.

(1) Fuel filler cap
(2) Rear grill
(3) Engine side cover (2 places)
(4) Cab door (2 places)

Remark

The ignition switch key is used also for locks (1), (2), (3) and (4).

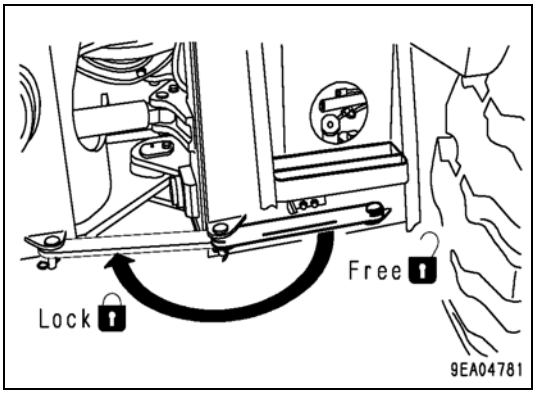




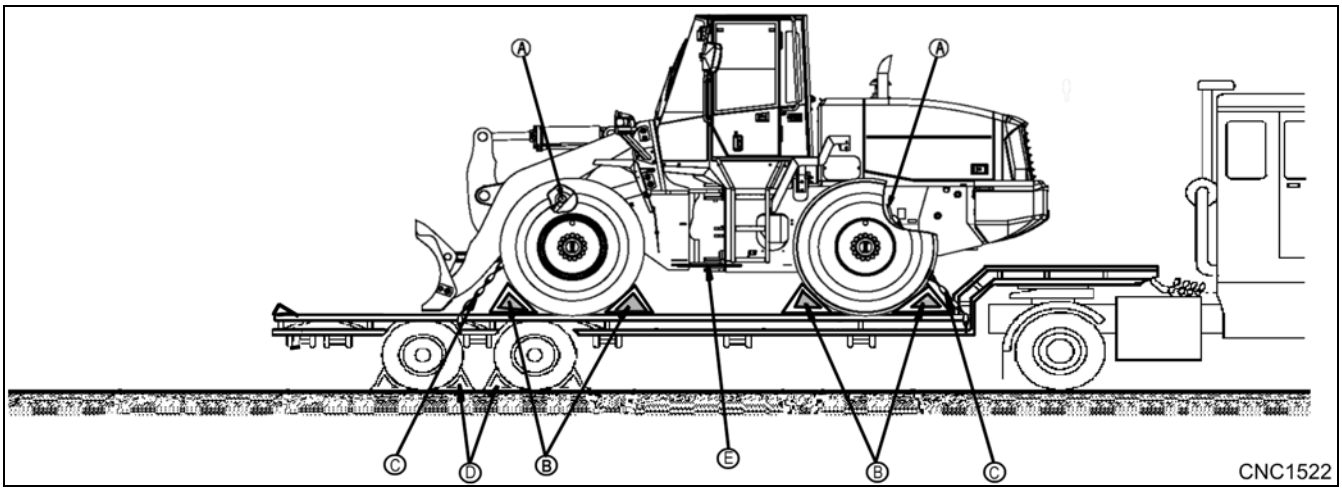
TRANSPORTING THE MACHINE

Before transporting the machine be sure what you are using to transport the machine is capable of supporting the weight and size 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.
- Be sure the machine is free of mud or debris that may hinder loading.
- Check the ramps and support surfaces for damage, week spots, missing boards or excess ware. If these surfaces look unsafe, too week or unstable do not load the machine. Be sure the loading equipment and transportation equipment are in good condition and rated for your load.
- Block the wheels on the trailer (D) before attempting to load the machine.
- Locate the tie down and transportation brackets (A & C)on the machine. Be sure they are in good condition.
- Position the machine squarely on the deck. Raise the loader bucket high enough to clear all surfaces.
- Once the machine has been loaded, rest the front bucket on the floor, set the machine in neutral and set the parking brake and lock the controls.
- Center the machines frame and lock the frame with the safety bar.
- Secure the machine with tie-downs/chains (C) at the anchor points shown in illustrations (A).

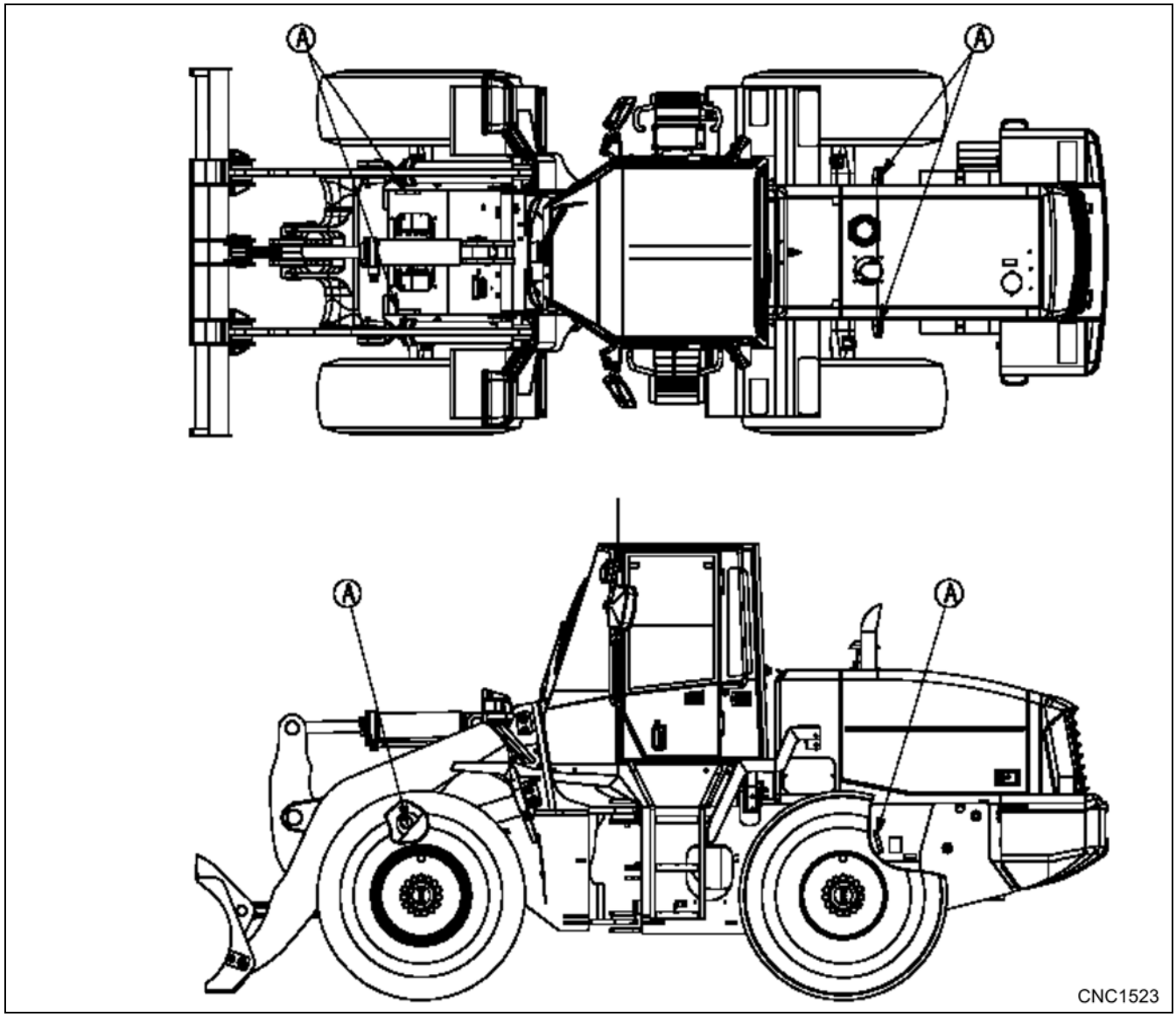


- To help keep the machine in position, place blocks (B) in front and behind the front and rear wheels for extra support.
- Protect the exhaust stack from moisture if needed.

LIFTING THE MACHINE

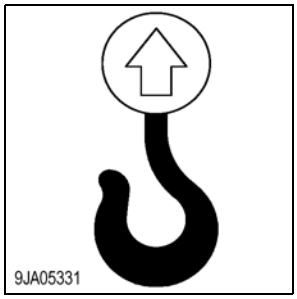
Lifting hooks (A) are located in 4 places on the machine as shown in the diagram below. Use only these 4 places when lifting; do not use any other places. There is a serious danger that the machine may lose its balance. Always stay clear of the machine and maintain a safe distance when lifting it.

LIFTING LOCATIONS AND PROCEDURES



Weight Table

	Machine Weight	Front Wheel Load	Rear Wheel Load	Center Of Gravity
WA320PT-5L	15350 kg (33841 lbs)	6790 kg (14969 lbs)	8560 kg (18871 lbs)	1690 mm (5ft 7 in)



USING WIRE ROPE

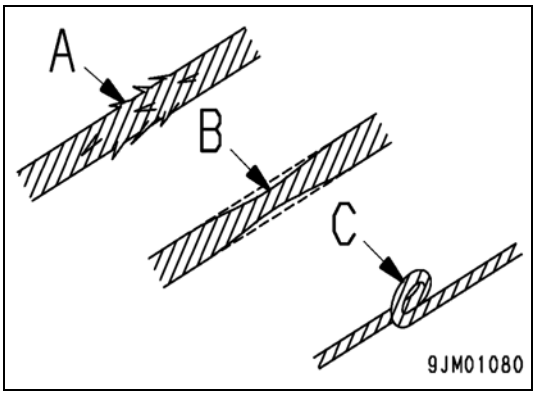
⚠ WARNING

- **When lifting the machine, if the wire rope is not installed correctly on the machine, the machine may fall and cause serous injury or even death. Raise the machine 100 to 200 mm (3.9 to 7.9 in) from the ground, check to be sure the machine is horizontal, level and that there is no slack in the wire rope, then continue to lift the machine.**
- **Before lifting the machine, always stop the engine and lock the brakes. Lock front frame and rear frame with safety bar.**
- **Lifting operations using a crane must be carried out by a qualified operator.**
- **Never raise the machine with any personnel on it.**
- **Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.**
- **When carrying out the lifting operation, please contact your Komatsu distributor.**

The lifting procedure applies to machines with standard specifications.The method of lifting differs according to the attachments and options actually installed. In such cases, contact your **Komatsu** distributor for information.

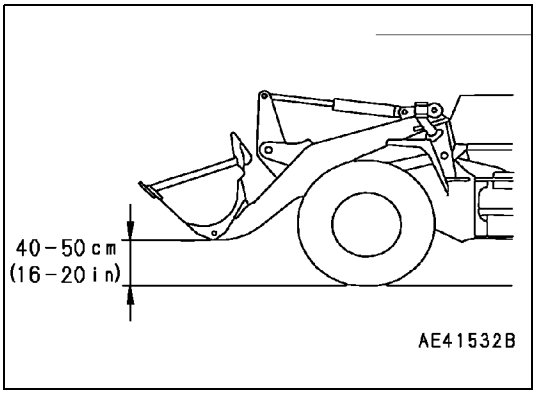
For details of the weight. See “WEIGHT TABLE” on page (2-79)

Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the lifting process.

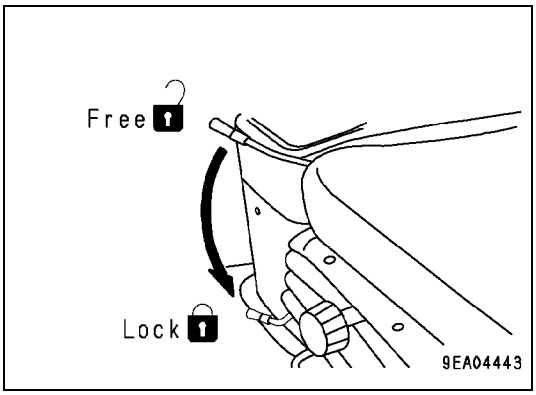


PRE LIFTING PROCEDURES

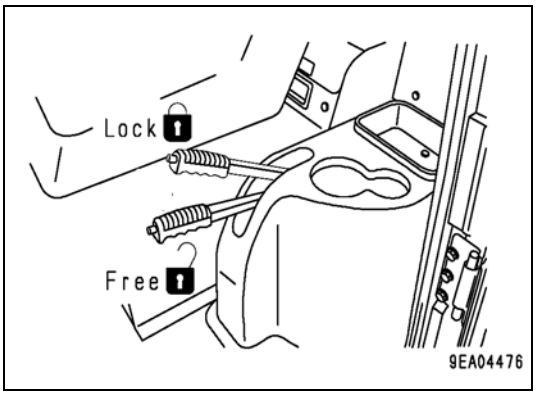
1. Start the engine and raise the work equipment to the travel height and roll the bucket back. Be sure the bucket is empty.



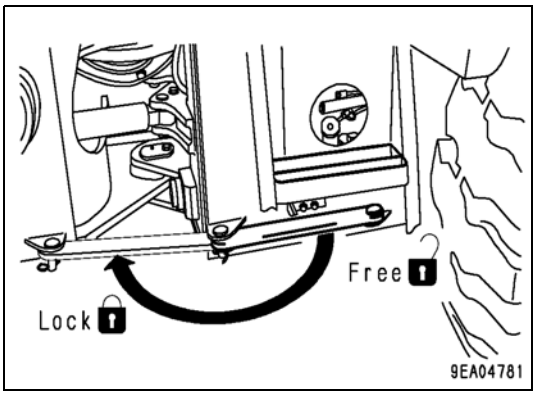
2. Once at the travel height, lock the controls and cut the engine off.



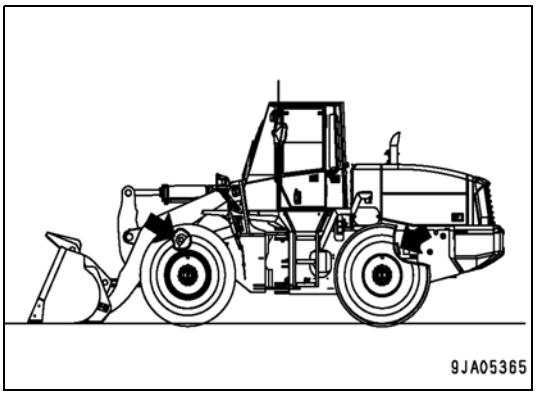
3. Place the directional lever in the N (neutral) position and set the parking brake.



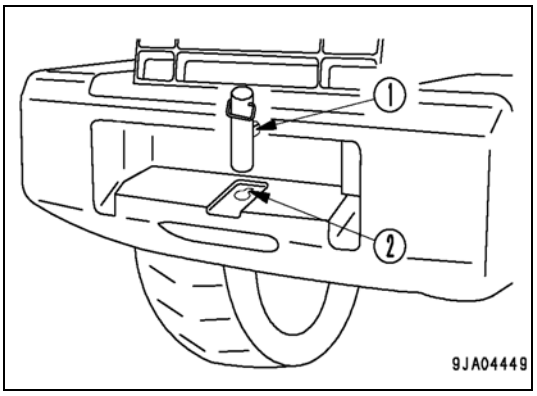
4. Lock the frames with the safety bar.



5. Using the lifting points, carefully lift the machine. Stay clear of the machine at a safe distance until at this point the machine is fully resting in place and the cables are slack.



TOWING THE MACHINE

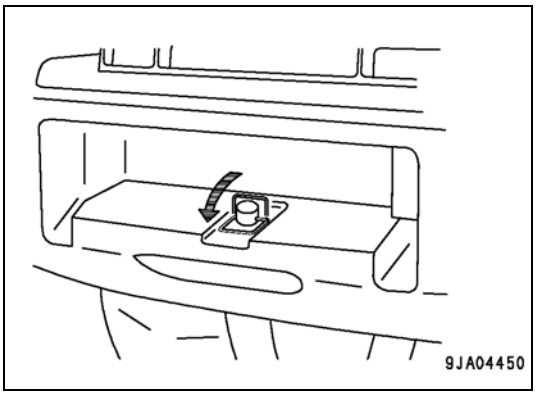


If this machine must not be towed except in emergencies. When towing the machine, take the following precautions.

1. Align the towing pin (1) with groove (2) in the counterweight, then insert the pin and turn it 180^0.

2. To prevent the towing pin from turning, fold the handle of the towing pin and set it in position. Reverse this operation to remove the pin.

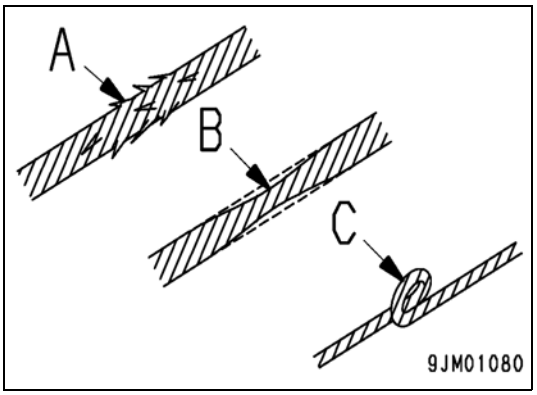
3. Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing process.



4. Before releasing the brakes, put blocks under the wheels to prevent the machine from moving. If the wheels are not blocked, the machine may suddenly move.

5. When towing a machine, tow it at a low speed of less than 2 km h (1.2 MPH), and for a distance of a few meters to a place where repairs can be carried out. If the machine must be moved long distances, use a transporter.

6. To protect the operator if the towing rope or bar should break, install a protector plate to the machine being towed.



7. If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.

8. Check that the tow rope or bar is of ample strength for the weight of the machine being towed. If the machine being towed must travel through mud or up hills, use a tow rope or bar of a strength of at least 1.5 times the weight of the machine being towed.

9. Keep the angle of the tow rope as small as possible. Keep the angle between the center lines of the two machines to within 30 degrees.

10. If the machine is moved suddenly, the tow rope or bar will be subjected to an excessive load, and it may break. Start the machine gradually and travel at a constant speed.

11. The towing machine should normally be of the same class as the machine being towed. Check that the towing machine has ample braking power, weight, and rim pull to allow it to control both machines on slopes or on the tow road.

12. When towing a machine downhill, use a larger machine for towing to provide ample rim pull and braking power, or connect another machine to the rear of the machine being towed. This way it is possible to prevent the machine from losing control and turning over.

13. Towing may be carried out under various differing conditions, so it is impossible to determine beforehand there requirements for towing. Towing on flat horizontal roads will require the minimum rim pull, while towing on slopes or on uneven road surfaces will require the maximum rim pull.

COLD WEATHER OPERATION

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity.
See “FUEL, LUBRICANTS COOLANT SPECIFICATIONS” on page (3-8).

COOLANT

Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large amount of fresh water and see a doctor at once. When changing the coolant contact your **Komatsu** distributor. Antifreeze is toxic, so do not dispose of antifreeze in drainage ditches, sewers, on the ground or other areas always trap and recycle this fluid.

Never use methanol, ethanol or propanol based antifreeze. Never use flammable liquids in the cooling system. Avoid using any leak-preventing agent, regardless if it is sold separately or in antifreeze. do not mix one antifreeze with a different brand.

For details on the antifreeze mixture when changing the coolant.
See “FLUSHING THE COOLING SYSTEM” on page (3-20).

Standard requirements for permanent antifreeze:

- SAE J1034
- FEDERAL STANDARD O-A-548D

PRECAUTIONS AFTER COMPLETION OF WORK

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

Remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rod clean to prevent damage to the seal caused by mud or dirt on the rod surface getting inside the seal together with drops of water.

Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards. The boards help protect the wheels from being frozen in soil and the machine can start next morning.

Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.

AFTER COLD WEATHER

When season changes and the weather becomes warmer, do as follows.
Replace the fuel and oil for all parts with oil of the viscosity specified. For details. See “FUEL LUBRICANTS AND COOLANTS” on page (3-8).

WARMING UP THE STEERING

When the temperature is low, do not start the operation of the machine immediately after starting the engine.

Slowly operate the steering wheel to the left and right to warm up the oil in the steering valve. (Repeat this operation for about 10 minutes to warm up the oil.)

LONG-TERM STORAGE

BEFORE STORAGE

When putting the machine in storage for a long time, do as follows.

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Make sure that the machine does not move by setting the safety lock lever in the **LOCK** position.

DURING STORAGE

- During storage, always operate the machine once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.
- When operating the work equipment, wipe off all the grease from the hydraulic cylinder rod.
- If the machine is equipped with an air conditioner, operate it for 3 to 5 minutes once a month to lubricate each portion of its compressor. Be sure to idle the engine at low speed for this purpose. Also, check the quantity of refrigerant twice a year.

AFTER STORAGE

When using the machine after long-term storage, do as follows before using it.

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease to all places.
- When a machine is stored for a long period, moisture in the air will get into the oil. Check the oil before and after starting the engine. If there is water in the oil, change the oil.

MAINTENANCE

BASIC TROUBLESHOOTING

ENGINE

Problem	Main Cause	Remedy
Engine oil pressure lamp remains on	• Low oil level in oil pan • Clogged oil filter • Defective turbo oil piping • Defective monitor	• Add oil to engine • Replace filter cartridge • Check for excessive oil leakage • Replace monitor
Steam coming from radiator cap Coolant temperature range in the red Coolant warning is light	• Low coolant level or leak • Defective water pump • Radiator is clogged internally • Radiator air flow is restricted • Defective thermostat • Radiator cap is defective • Defective monitor	• Check for leek and add coolant • Flush cooling system replace water pump • Re-core or flush radiator • Clean and straighten radiator fins • Replace thermostat • Replace radiator cap • Replace monitor
Coolant temperature is in the white range	• Defective thermostat • Defective monitor	• Replace thermostat • Replace monitor
Engine does not start when starter motor is cranking the engine	• Lack of fuel • Air in fuel system • No fuel in fuel filters • Defective infection pump • Cold weather, no preheat • Defective valve clearance	• Add fuel • Repair air leakage • Fill fuel filters • Replace injection pump • Check preheat system operation • Adjust valve clearances
Exhaust gas is white or blue color	• Too much oil in oil pan • Improper fuel	• Bring oil level to proper spec. • Replace fuel
Exhaust gas occasionally turns black	• Clogged air cleaner • Defective injection nozzle • Poor engine compression • Defective turbocharger	• Clean or replace • Replace nozzle • Check engine compression • Check turbo condition
Abnormal noise is heard around the combustion chamber	• Defective injection nozzle	• Replace injection nozzle
Abnormal mechanical noise is heard	• Low grade fuel is being used • Engine overheating • Damaged muffler • Excessive valve clearance	• Change to better fuel • Allow engine to cool down • Replace muffler • Adjust valve clearance

CHASSIS

Problem	Main Cause	Remedy
	HST	
Engine is running, in F or R position bud foes not move	• Parking brake is applied • Directional lever is not shifted properly • Electrical problem • Lack of oil in tank	• Release parking brake fully • Shift lever properly • Check fuse or electrical system • Add oil as needed
Even when engine is running at full throttle the machine lacks power	• Lack of oil in hydraulic tank • Hydraulic temperature too low	• Add oil to proper level • Warm machine up
Oil overheats	• Too much or too little oil • Clogged oil cooler	• Add or drain oil • Clean oil cooler
Noises are heard in system	• Lack of transfer oil	• Add oil to specified level
	Axle	
Noises are heard in axle	• Lack of oil • Improper oils used	• Add oil to specified level
	Brakes	
When pedal is depressed the brakes do not work	• Disc has reached wear limit • Defective hydraulic system • Air in the system	• Reline and replace disks • Add oil to specified level • Bleed air from system
Brakes drag	• Defective adjustment • Vent hole in brake valve is plunged	• Check and repair
Brakes squeal	• Disk is worn • Water mixed in the oil • Deteriorate oil	• Reline and replace disks • Replace with fresh oil
	Parking Brake	
Parking brake will not hold machine	• Linkage is loose • Disk is worn	• Adjust • Replace disk
	Steering	
Steering effort is heavy	• Defective hydraulic system • Lack of oil	• Add oil to specified level
Excessive play in steering wheel	• Steering cylinder pin is loose • Defective hydraulic system	• Grease or replace pin • Add oil to specified level
	Hydraulic System	
Work equipment lacks lifting power Work equipment is slow	• Lack of oil • Clogged filter	• Add oil to specified level • Replace filter

Excessive bubbles in the oil	• Poor quality oil • Lack of oil • Air in the oil	• Replace with good quality oil • Add oil to specified level • Bleed air from system
Lack of oil pressure	• Lack of oil causes pump to suck in air	• Add oil to specified level
Irregular movement of cylinders	• Lack of oil	• Add oil to specified level

ELECTRICAL

Problem	Main Cause	Remedy
Lamps do not glow brightly even when the engine is running at high speed Lamps flicker when engine is running	• Defective wiring • Defective alternator belt	• Check wiring connections • Adjust the alternator belt tension
Even when the engine is running the caution lamp remains on	• Defective alternator • Defective wiring • Defective alternator belt	• Replace alternator • Check and repair • Adjust alternator belt
Noise is heard around the alternator	• Defective alternator	• Replace alternator
Starter motor does not crank the engine	• Defective wiring • Low battery power • Defective starter	• Check wiring • Charge or test battery • Replace starter
Starter drive keeps kicking out when engine is cranking	• Low battery charge	• Charge battery
Starter motor turns engine slowly	• Low battery charge • Defective starter	• Charge battery • Replace starter
Starter motor disengages prematurely during engine cranking	• Defective wiring • Poor battery condition	• Check wiring • Check battery
Preheat lamp does not light	• Defective wiring • Defective preheat relay or sensor • Defective preheat indicator	• Check and repair • Replace
When the ignition key is turned to the ON position all lamps do not light	• Defective wiring • Defective monitor	• Check and repair wiring • Replace monitor

GUIDE TO MAINTNANCE

Before opening the engine hood to perform repairs, engage safety locks of both the front loader and frame. See “SAFETY LOCK BAR” on page (2-41).

- If it is necessary to check the hydraulic oil level in the reservoir, arrange the machine with the front end loader all the way down and the machine sitting on a level surface.
  Only perform repair 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 placing 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 high pressure washing inside the machines cab.
- 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.**

CARRYING OUT KOWA (KOMATSU OIL WEAR ANALYSIS)

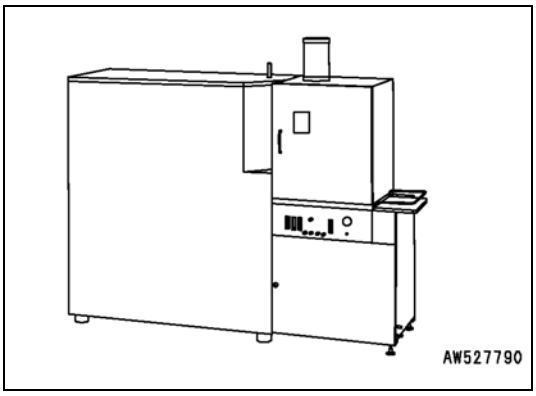
KOWA is a maintenance service that makes it possible to prevent machine failures and downtime. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

Periodic use of KOWA makes the following possible:

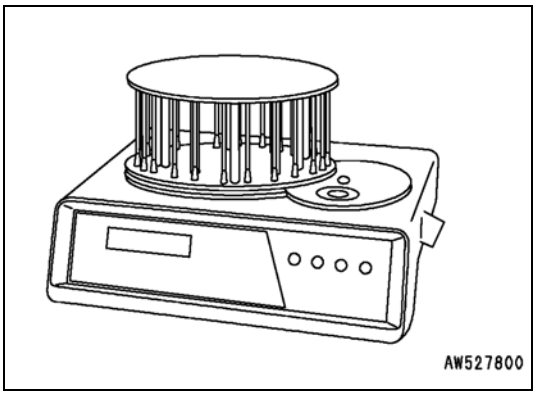
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

KOWA ANALYSIS ITEMS

Analysis of metal wear particles This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of metal wear particles in the oil.



Measurement of particle quantity This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of large iron particles in the oil.



Others Measurements are made of items such as the ratio of water or fuel in the oil, and the dynamic viscosity.

OIL SAMPLING

Sampling interval

- 250 hours: Engine
- 500 hours: Other components

Precautions when sampling

- Make sure that the oil is well mixed before sampling.
- Carry out sampling regularly at fixed intervals.
- Do not carry out sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your **Komatsu** Dealer.

WEAR PARTS

Replace wear parts such as the filter element or air cleaner element at the time of periodic maintenance or before they reach the wear limit. The wear parts should be replaced correctly in order to ensure more economic use of the machine. When replacing parts, always use **Komatsu** genuine parts. As a result of our continuous efforts to improve product quality, the part number may change, so inform your **Komatsu** Dealer of the machine serial number and check the latest part number when ordering parts.

Item		Part No.	Part Name	Q'ty	Replacement Interval
Engine Oil Filter		6736-51-5141	Cartridge	1	EVERY 500 HOURS
Fuel Filter		6732-71-6111	Cartridge	1	EVERY 500 HOURS
HST Filter		418-18-34160	Cartridge	1	EVERY 1000 HOURS
Transfer Strainer		07000-73042	O-ring	1	EVERY 1000 HOURS
Hydraulic Filter		419-60-35153	Cartridge	1	EVERY 2000 HOURS
Hydraulic Tank Breather		417-60-15380	Element	1	EVERY 2000 HOURS
Air Cleaner		600-185-3100	Element assy.	1	-
A/C Filter	fresh	427-07-22120	Element	1	EVERY 2000 HOURS
	recirc	20Y979-6261	Element	2	EVERY 2000 HOURS
Bolt On Cutting Edge		419-815-1211 418-815-1221 (02090-11685) (02290-11625) 01643-32460)	Center edge Side edge Bolt Nut Washer	1 2 8 8 8	-
Electrical Intake Air Heater		6732-11-4811	Gasket	2	-

FUEL SPECIFICATIONS

When purchasing fuels, coolants to lubricants it is important to follow the recommendations set forth by **Komatsu**. Using non recommended fuels, lubricants or coolants may damage the machine or reduce the machines efficiency.

FUELS

Use only diesel fuel No 2
Fuel Specification: ASTM D975

- When fuel sulphur content is less than 0.5%, change oil in the oil pan according to the periodic maintenance hours described in this manual.
- Change oil according to the following table if fuel sulphur content is above 0.5%.
- When starting the engine with an atmospheric temperature of lower than 0×C (32×F), be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though the atmospheric temperature goes up to 10×C (50×F) more or less during the day.
- 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, 15W-40), but be sure to add single grade oil that matches the temperature range in the table.
- We recommend **Komatsu** genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

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

Fuel sulphur content	Charge interval
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

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.
- If machine is equipped with an electronically injected engine do not touch wiring harness when engine is running severe electrical shock may result.

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.

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 CE CD	**SAE 5W-30**									20 liter (5.8 US gal) Aspirated engine	19.5 liter (5.15 US gal) Aspirated engine
			SAE 10W									
				SAE 20W-20								
					SAE 30							
						SAE 40						
			SAE 10W-30									
				SAE 15W-40								
Hydraulic system		**SAE 5W***									175 liter (46.24 US gal)	89 liter (25.51 US gal)
			SAE 10W									
					SAE 30							
			SAE 10W-30									
Front axle: Differential	Axle oil			**AX 080, 090 and 140**							24 liter (6.34 US gal)	24 liter (6.34 US gal)
Rear axle: Differential				**AX 080, 090 and 140**							24 liter (6.34 US gal)	24 liter (6.34 US gal)
Transfer case			**SAE 10W-30**								8 liter (2.11 US gal)	6.5 liter (1.72 US gal)
HST					**SAE 10W-30**						175 liter (46.24 US gal)	89 liter (25.51 US gal)
Fuel tank	Diesel fuel		**ASTM D975 No. 1**		**ASTM D975 No. 2**						228 liter (60.24 US gal)	-
Engine cooling system	Coolant		**Anti-freeze Summer coolant**								20 liter (5.28 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 and fuel to be used.

STANDARD TIGHTNING TORQUES

If nuts, bolts, or other parts are not tightened to the specified torque, it will cause them to loosen or damage to the tightened parts, and this will cause failure of the machine or problems with operation. Always pay careful attention when tightening parts. Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. If it is necessary to replace any nut or bolt, always use a **Komatsu** genuine part of the same size as the part that was replaced.

Thread diameter a(mm)	Width across flat b(mm)	Tightening torque			
		Target value		Service limit	
		N•m	lbft	N•m	lbft
6	10	13.2	9.8	11.8 - 14.7	8.7 - 10.8
8	13	31	23.1	27 - 34	20.3 - 25.3
10	17	66	48.5	59 - 74	43.4 - 54.2
12	19	11	83.2	98 - 123	72.3 - 90.4
14	22	177	130.2	157 - 196	115.7 - 144.7
16	24	279	206.1	245 - 309	180.8 - 227.8
18	27	382	282.1	343 - 425	253.2 - 314.6
20	30	549	405.0	490 - 608	361.7 - 448.4
22	32	745	549.7	662 - 829	488.2 - 611.2
24	36	927	683.5	824 - 1030	607.6 - 759.5
27	41	1320	976.5	1180 - 1470	868.0 - 1085.0
30	46	1720	1265.8	1520 - 1910	1121.1 - 1410.4
33	50	2210	1627.4	1960 - 2450	1446.6 - 1808.3
36	55	2750	2025.2	2450 - 3040	1808.3 - 2242.2
39	60	3280	2423.1	2890 - 3630	2133.7 - 2676.2

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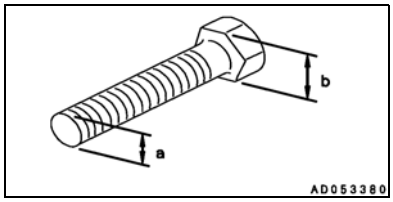
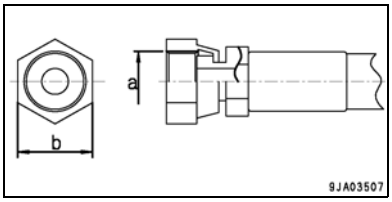


Apply the following table for Hydraulic Hose.

Thread diameter a(mm)	Width across flat b(mm)	Tightening torque			
		Target value		Service limit	
		N•m	lbft	N•m	lbft
14	19	29.4	21.7	27.5 - 39.2	20.3 - 28.9
18	24	78.5	57.3	58.8 - 98.1	43.4 - 72.3
22	27	117.7	86.8	88.3 - 137.3	65.1 - 101.3
24	32	147.1	108.5	117.7 - 176.5	86.8 - 130.2
30	36	215.7	159.1	176.5 - 245.2	130.2 - 180.8
33	41	255.0	188.1	215.7 - 284.4	159.1 - 209.8

CNC0380



PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To use the machine safely for an extended period of time, you must periodically replace the safety critical and fire prevention-related parts listed in the table of important parts. Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence, it is required to replace them with new ones regardless of their condition after a certain period of usage. This is important to ensure that these parts maintain their full performance at all times. Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived. If any of the hose clamps show deterioration like deformation or cracking, replace the clamps at the same time as the hoses. Also carry out the following checks with hydraulic hoses which need not be replaced periodically. Tighten a loosened clamp or replace a defective hose, as required. When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time. Ask your **Komatsu** Dealer to replace the critical parts.

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - water separator)	1	Every 2 years or every 4000 hours, whichever comes first
2	Fuel hose (water separator - pump)	1	
3	Fuel return hose (pump - fuel tank)	1	
4	Fuel spill hose (tube - fuel tank)	1	
5	Turbocharger lubricating hose	1	
6	Steering hose (pump - priority valve)	1	
7	Steering hose (priority valve - orbitrol valve)	1	
8	Steering hose (orbitrol valve - steering cylinder)	6	
9	Steering hose (steering cylinder line - cushion valve)	2	
10	Pickings, seals, O-rings of steering cylinder	2	
11	Brake hose (gear pump - master cylinder)	1	
12	Brake hose (master cylinder - front brake)	2	
13	Brake hose (master cylinder - rear brake)	2	
14	Brake hose (master cylinder - accumulator)	2	
15	Brake hose (accumulator - charge valve)	2	
16	Brake hose (master cylinder - hydraulic tank)	1	
17	Brake hose (charge valve - hydraulic tank)	1	
18	O-rings and oil seals of brake valve	7	
19	Seat belt	1	Every 3 years

MAINTENANCE SCHEDULE CHART

This is a schedule outlining the maintenance to be performed on the machine according to the hours accumulated on the machine. Following these scheduled items will prolong the life of the machine.

FIRST 250 HOURS SERVICE

Carry out the following maintenance only after the first 250 hours.

- Replace HST filter element
- Replace hydraulic filter element

For details on replacing or maintaining, see the section on “EVERY 1000 HOURS SERVICE” and “2000 HOURS SERVICE”.

SERVICING WHEN REQUIRED

CHECK, CLEAN OR REPLACE AIR CLEANER ELEMENT

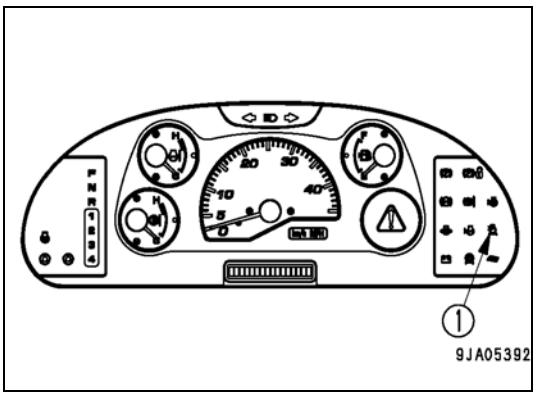
WARNING

If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and damage it. Always stop the engine before carrying out these operations. When using compressed air, there is danger that dirt may be blown around and cause serious injury. Always use safety glasses, dust mask, and other protective equipment.

CHECK

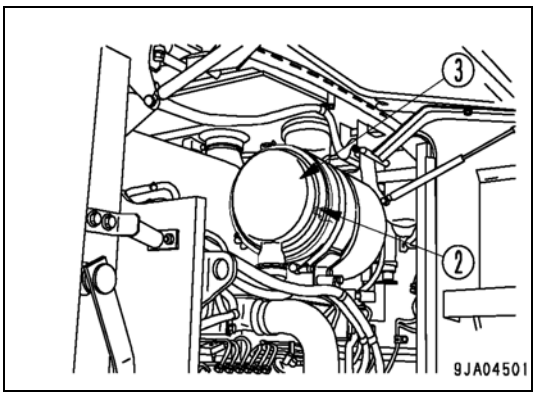
If air cleaner clogging caution lamp (1) on the machine monitor lights up, clean the air cleaner element.

Do not clean the element until the air cleaner clogging caution lamp lights up.If the element is cleaned frequently before the air cleaner clogging caution lamp lights up, the air cleaner will not be able to reach its performance and the cleaning efficiency will drop. In addition, the frequency of dirt stuck to the element falling inside the inner element will increase.

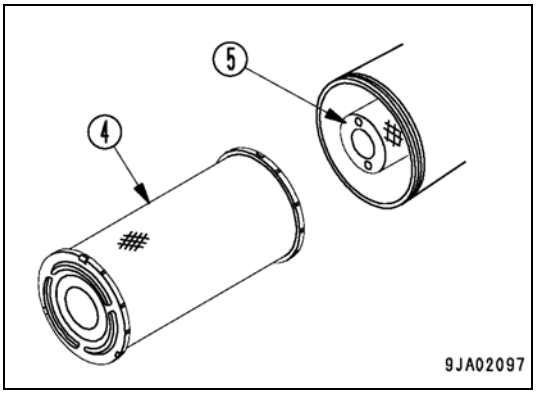


CLEAN

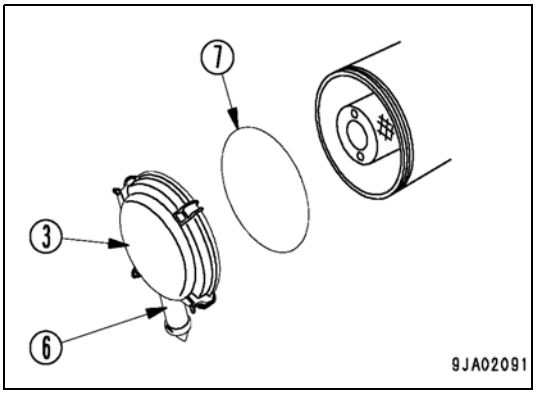
1. Open the engine side cover on the right side of the machine.
2. Remove three clips (2), then remove cover (3).
3. Never remove inner element (5). If it is removed, dust will enter and cause engine trouble.



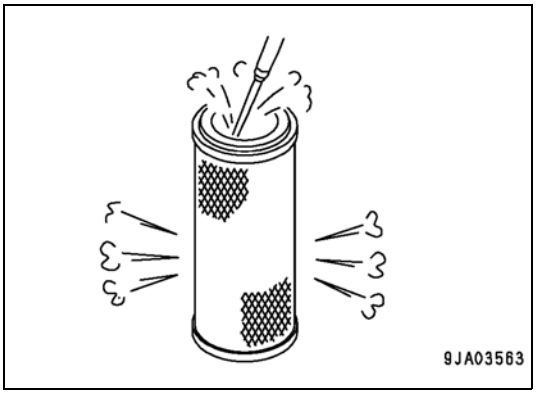
4. Remove outer element (4).



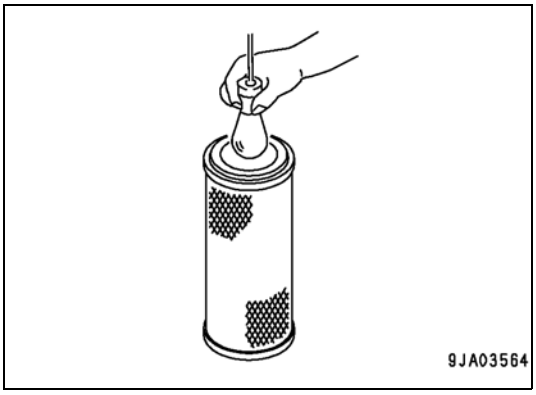
5. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6). The inner element must not be used again even after its cleaning. When replacing the outer element and seal (7) replace them at the same time.



6. Direct dry compressed air Max. 0.69 MPa 7 kgf/cm^2 (99.4 PSI) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.
   A. Replace any outer element, which has been cleaned 6 times or used for one year. Replace the inner element at the same time.
   B. Replace both inner and outer elements when the air cleaner clogging caution lamp lights up immediately after installing the cleaned outer element even though it has not been cleaned 6 times.

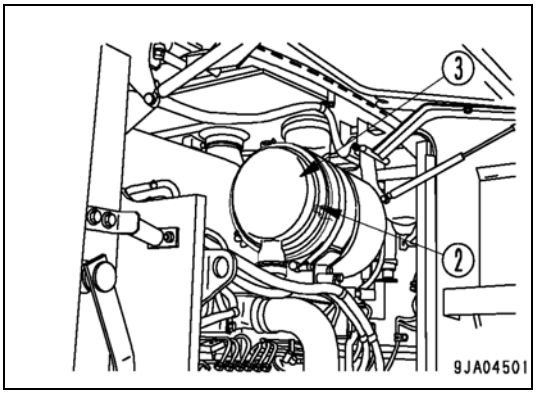


7. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element. When cleaning the element, do not hit or beat it against anything. Do not use an element whose folds, gasket or seal are damaged.
8. Set the cleaned outer element in position, then secure cover (3) with mounting clips (2).

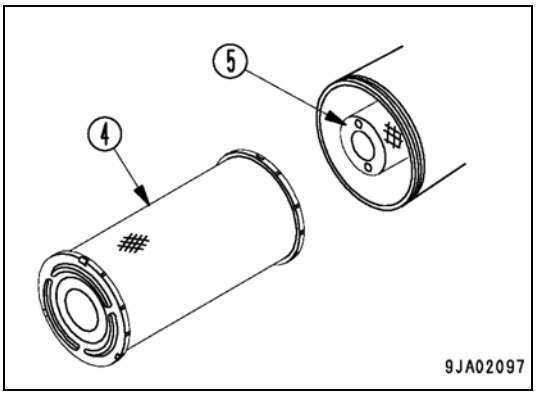


REPLACE AIR CLEANER ELEMENT

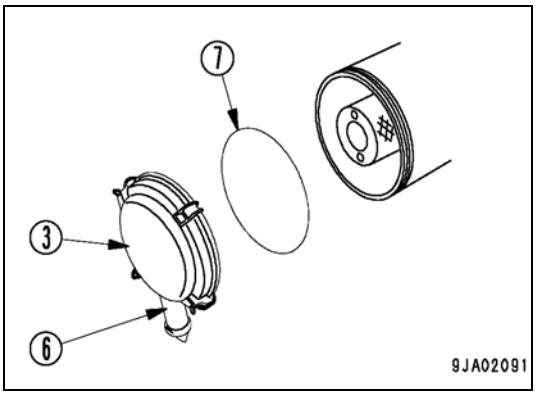
1. Open the engine side cover on the right side of the machine.
2. Remove three clips (2), then remove cover (3).



3. Remove outer element (4). Do not remove inner element (5) at this time.



4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).
5. Remove inner element (5), then install a new inner element immediately.
6. Fit new outer element (4), replace O-ring (7) with a new part, install cover (3), then secure with clips (2).



FLUSHING THE COOLING SYSTEM

⚠ WARNING

- **Immediately after the engine is stopped, the engine coolant is hot and the pressure inside the radiator is high. Removing the cap and draining the water under this condition could cause burns. Allow the engine to cool down, then turn the cap slowly to release the pressure.**
- **Start the engine and flush the system. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position.**
- **For details of starting the engine. See CHECK BEFORE STARTING ENGINE, ADJUST (3-59) and STARTING ENGINE (3-72) in the OPERATION section of the Operation and Maintenance Manual.**
- **When the undercover is removed, there is danger of touching the fan.**
- **Never go to the rear of the machine when the engine is running.**

To clean the inside of the cooling system, change the coolant and replace the corrosion resistor according to the table below.

Coolant Type	Flushing System	Corrosion Resistor (K1)
Permanent type ant-freeze all season	Every year (autumn) or every 200 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant
Non-permanent type anti-freeze containing ethylene glycol (winter one season)	Every 6 months (spring and autumn) Drain in spring and add anti-freeze in autumn	

Stop the machine on level ground when cleaning or changing the coolant. Use a permanent type of antifreeze. If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol. Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect. The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary. In areas where the water is hard, always add **Komatsu** genuine corrosion resistor agent KI. One packet of corrosion resistor agent contains 100g (0.22 lb). The standard density of the mixture should be 7g/liter (0.065 oz/US gal). When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below. It is actually better to estimate a temperature about 10^0C (50^0F) lower when deciding the mixing rate.

Mixing Rate Of Water And Antifreeze

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

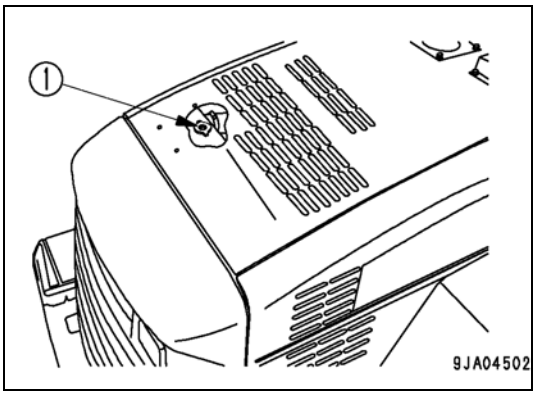
⚠ WARNING

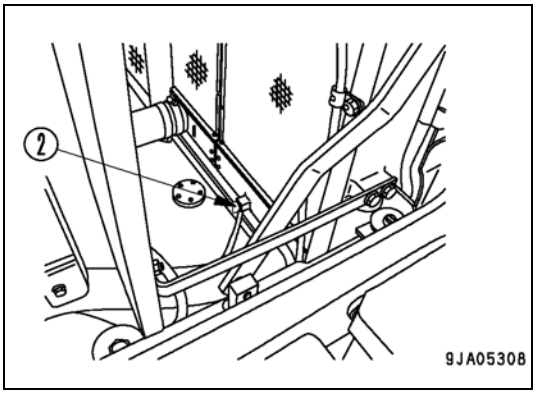
Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large amount of fresh water and see a doctor at once.

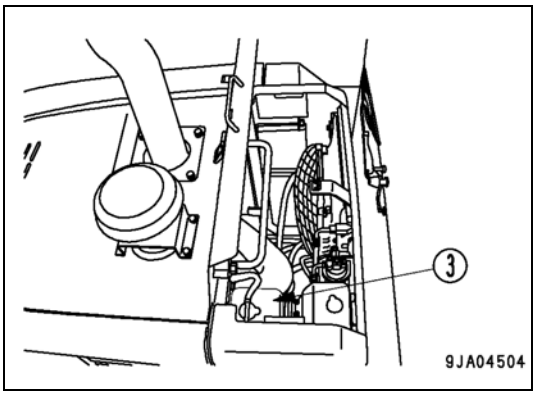
Use distilled water for the cooling water. Do not use river water, well water, contact your **Komatsu** Dealer. We recommend use of an antifreeze density gauge to control the mixing proportions.

- Prepare a container to catch drained coolant:
  Min. 20 liters (5.28 US gal) capacity.
- Prepare a water inlet hose.

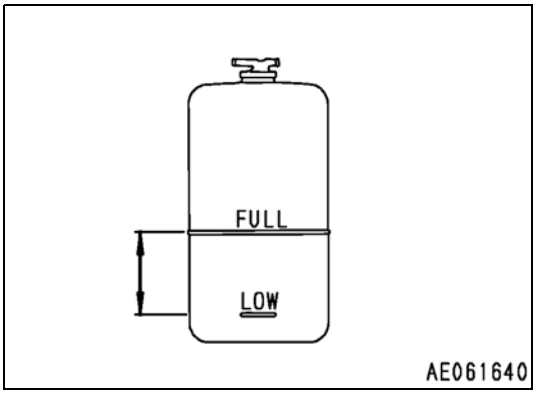
1. Stop the engine.
2. Check that the cooling water temperature has gone down enough to make it possible to touch the radiator cap surface by hand, then turn radiator cap (1) slowly until it contacts the stopper to release the pressure.
3. Following this, push radiator cap (1), turn it until it contacts the stopper, then remove it.
4. Set a container in position to catch drained antifreeze mixture, then open valve (2) under the radiator to drain cooling water.
5. After draining the water, close drain valve (2) and fill with distilled water.
6. When the radiator is full, start the engine, and run it at low idling. Keep the engine running at low idling for 10 minutes until the water temperature reaches more than 90^0C (194^0F).
7. Stop the engine, open drain valves (2), drain the water, then tighten them again.
8. After draining the water, clean the cooling system with cleaning agent. For the cleaning method, see the instructions for the cleaning agent.
9. Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.
10. To remove the air in the cooling system, run the engine for 5 minutes at low idling, and for another 5 minutes at high adding. (When doing this, leave the radiator cap off.)







11. After draining reserve tank (3), clean the inside of the reserve tank and refill the water between **FULL** and **LOW** level.
12. Stop the engine. About 3 minutes later, supply city water up to the water filler, then close radiator cap.



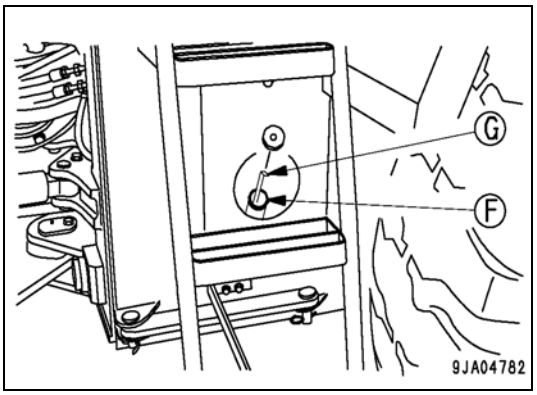
CHECKING OIL LEVEL IN TRANSFER CASE, ADD OIL

⚠ WARNING

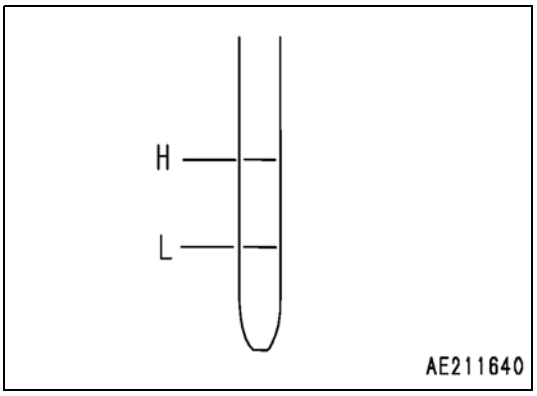
The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.

Carry out this procedure if there is any sign of low oil on the transfer case.

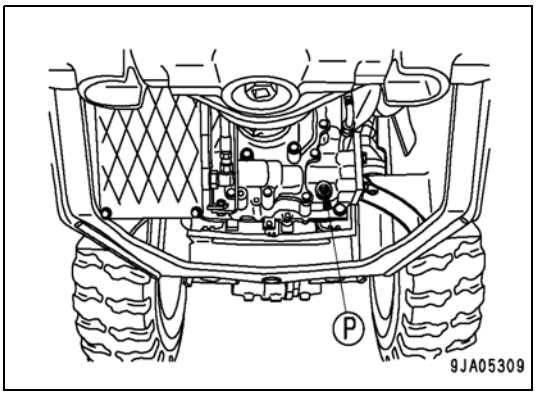
1. Start the engine and run it at low idling for at least 5 minutes.
2. Open the cap of oil filler port (F), remove dipstick (G), and wipe the oil off with a cloth.
3. Insert dipstick (G) fully in the oil filler pipe, then take it out again.



4. The oil level should be between the H and L marks on dipstick (G). If the oil level is below the L mark, add oil through oil filler (F).



5. If the oil is above the H mark, drain the excess engine oil from drain plug (P), and check the oil level again.
6. If the oil level is correct, insert dipstick (G) in the dipstick guide, then tighten the cap and lock.



CHECKING AXLE OIL LEVEL, ADD OIL

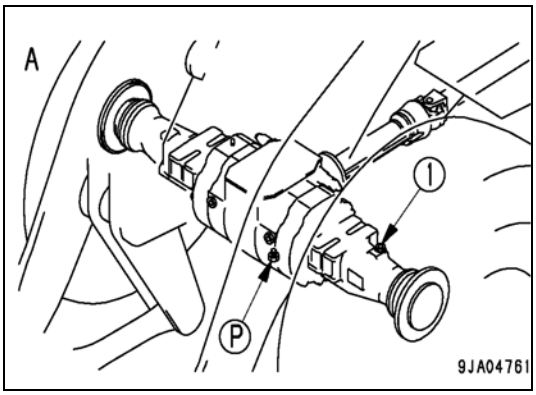
⚠ WARNING

- **When checking the oil level, apply the parking brake and secure the front and rear frames with the safety bar. After stopping the engine, the parts and oil are at a high temperature. Wait for the temperature to go down before starting the operation.**

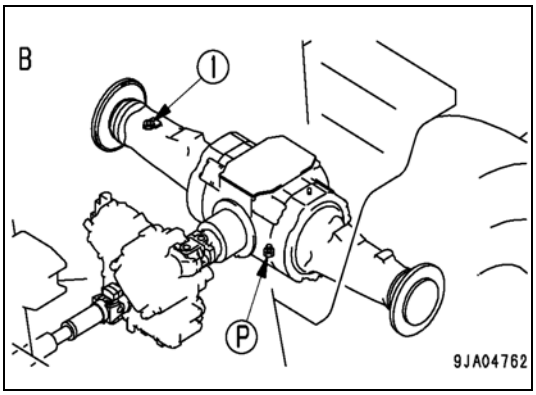
Carry out this procedure if there is any sign of oil loss on the axle case. Carry out the inspection with the machine on a horizontal road surface. (If the road surface is at an angle, the oil level cannot be checked correctly.)

- **A**: Front **B**: Rear

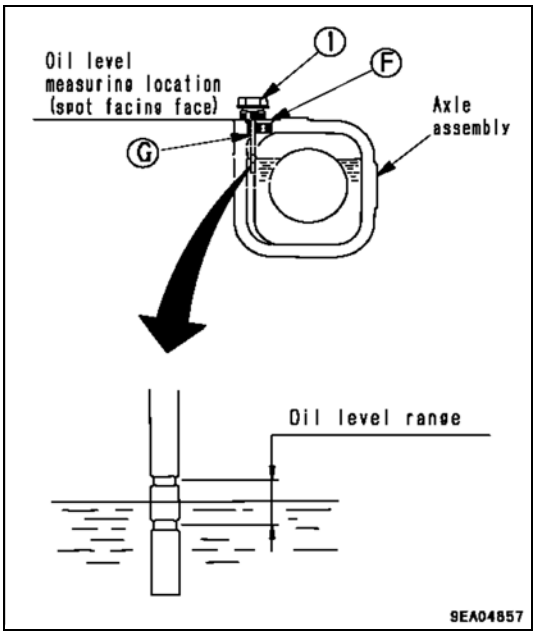
1. Stop the engine and remove the mud and dirt from around plug (1), then remove the plug (1).
2. Wipe off any oil adhering to the oil level gauge attached to plug (1) with cloth.



3. Use the oil level gauge (G) as shown in the right diagram.
4. The oil level is correct when it is between the two lines provided on the oil level gauge. If the oil level does not reach the lower line, add axle oil through filler port (F).



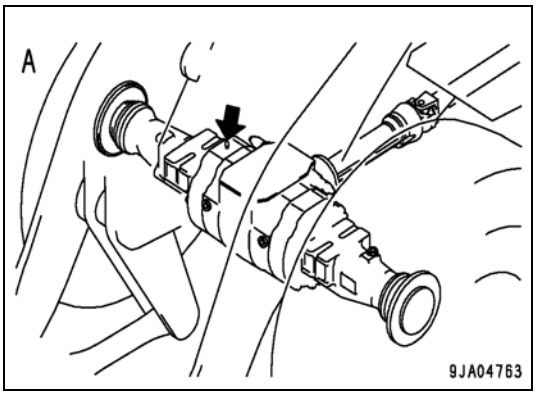
5. If the oil level is above the upper line, drain off the excess oil through drain plug (P) and check the oil level again.
6. If the oil level is correct, install plug (1). Tightening torque: 93 to 123 Nm 9.5 to 12.5 kgf²m, (68.7 to 90.4 ft/lbs)



CLEANING AXLE CASE BREATHER

WARNING

When cleaning the axle breather, apply the parking brake and secure the front and rear frames with the safety bar.

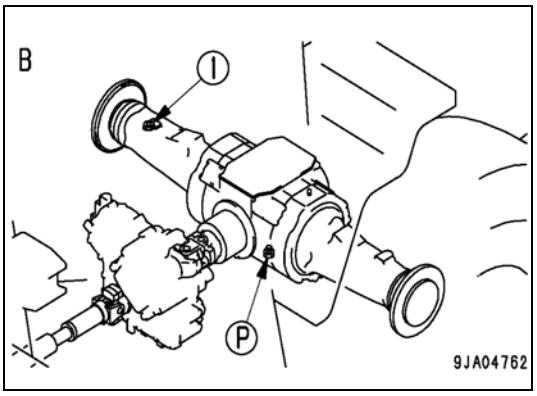


- **A**: Front **B**: Rear

Remove all mud and dirt from around the breather. After removing the mud or dirt from around the breather, remove the breather, immerse it in cleaning fluid and clean it.

When cleaning the breather, clean the breathers at two places (front and rear).

After removing the breather, take steps to prevent dirt or dust from entering the mount.



CLEANING AIR CONDITIONER CONDENSER

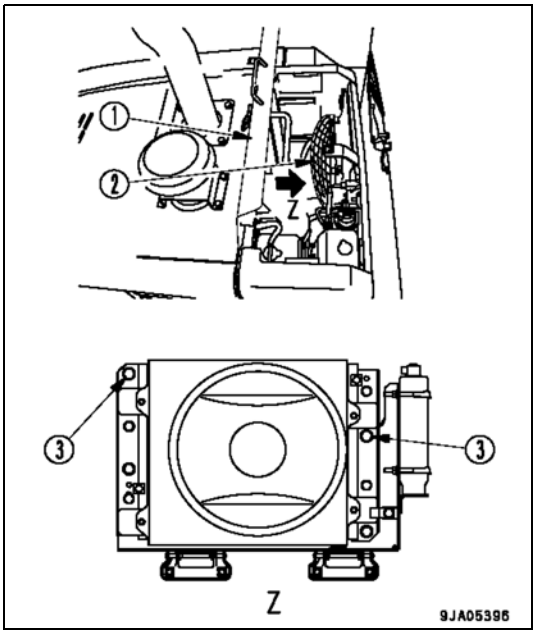
WARNING

- **Do not wash the condenser with a steam cleaner. There is danger that the condenser could overheat.**
- **Always wear protective glasses, dust mask, and other protective equipment.**

If there is mud or dust on the air conditioner condenser, clean it with water. If the water pressure is too high, the fins may get damaged. When washing with a high pressure washing machine, apply the water from a reasonable distance.

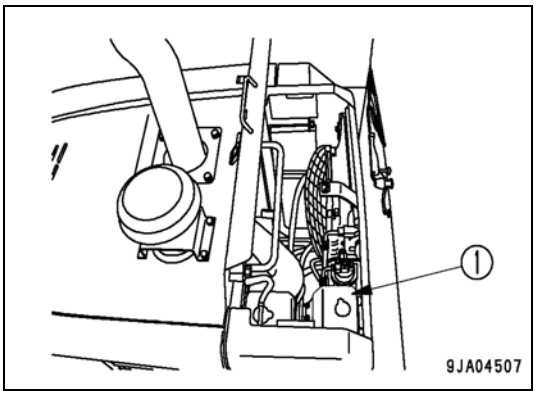
WASHING METHOD

1. Open top cover (1) at the front of the engine hood.
2. Remove 2 mounting bolts (3) at the top of condenser (2).
3. Hold the top of condenser (2) and tip it to the rear. A gap is formed between the engine hood and condenser.
4. Wash with water from the top.
5. Pull condenser (2) back to the original position and fit bolt (3).



CHECKING WINDOW WASHER FLUID LEVEL

Check the washing fluid levels in washer tank (1). When the fluid has run low, add automotive window washing fluid.
Be careful not to let dust get into the fluid.



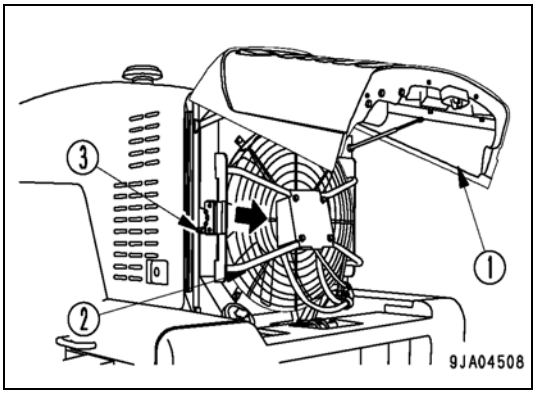
CLEANING RADIATOR COOLING FINS

⚠ WARNING

- **Never open the engine side cover when the engine is running. Stop the engine completely before starting the cleaning operation.**
- **If compressed air, pressurized water, or steam hits your body directly, or causes dirt to fly, it may lead to personal injury. Always wear safety glasses, dust mask, or other protective equipment.**

Clean the radiator core or cleaner if mud or dirt is stuck to it.

1. Open rear grill (1).
2. Move lever (3) of fan guard (2) down to release the lock, then open fan guard (2).
3. Use compressed air to clean the mud, dust, and leaves from the radiator and oil cooler fins. Steam or water may be used instead of compressed air.



Remark

If the steam jet nozzle is brought too close to the radiator fins, it may damage the fins, so keep the nozzle a suitable distance away from the fins when cleaning.

4. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by ageing. Also, check hose clamps for looseness.
5. After cleaning, close fan guard (2), apply the lock, then close rear grill (1).

CLEANING TRANSFER OIL COOLER FINS

WARNING

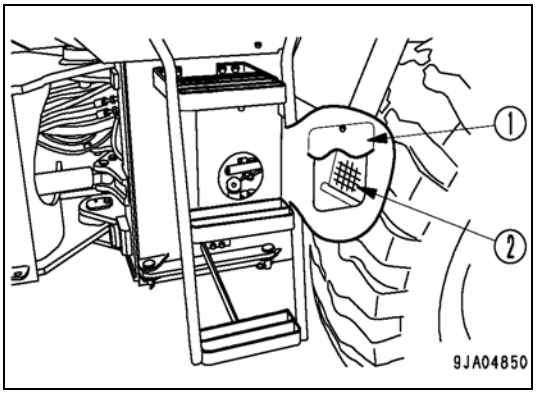
If compressed air, high-pressure water, or steam hits your body directly or dirt is sent flying by the compressed air, high-pressure water, or steam, there is danger of personal injury. Always wear protective glasses, dust mask, and other protective equipment.

Clean the oil cooler if mud or dirt is stuck to it.

1. Remove cover (1).
2. Use compressed air to clean the mud, dust, and leaves from the oil cooler fins (2). Steam or water may be used instead of compressed air.
3. After cleaning, install the cover (1).

Remark

If the steam jet nozzle is brought too close to the oil cooler fins, it may damage the fins, so keep the nozzle a suitable distance away from the fins when cleaning.



CHECKING ELECTRICAL INTAKE AIR HEATER

Before the start of the cold season (once a year), contact your **Komatsu** Dealer to have the electrical intake air heater checked for dirt or disconnections.

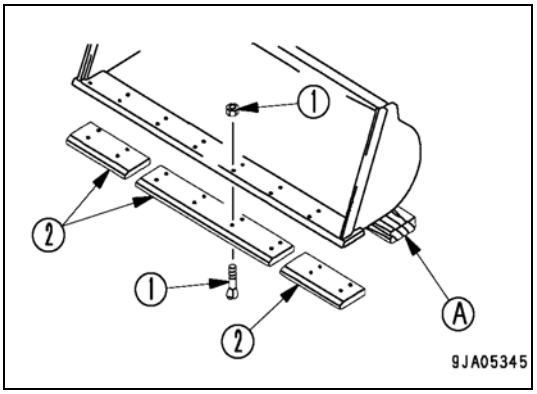
REPLACING BOLT ON CUTTING EDGE

WARNING

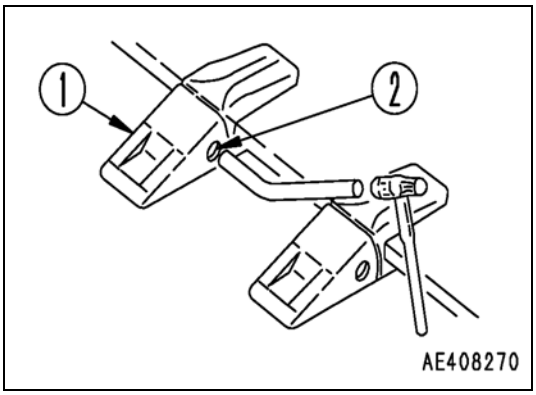
It is extremely dangerous if the work equipment moves when carrying out the turning or replacement operation.
Set the work equipment in a stable position, stop the engine, then set the safety lock lever securely to the LOCK position.

Turn or replace the cutting edge before the wear reaches the edge of the bucket.

1. Raise the bucket to a suitable height, then put blocks (A) under the bucket to prevent the bucket from coming down. Raise the bucket so that the bottom surface of the bucket is horizontal.
2. Remove nuts and bolts (1), then remove cutting edge (2).
3. Clean the mounting surface of cutting edge (2).
4. Turn cutting edge (2) and install it to the bucket. When turning the edge, install it to the opposite side (left edge to right side, right edge to left side). If both sides of the cutting edge are worn, replace with a new part. If the wear extends to the mounting surface, repair the mounting surface before installing the cutting edge.
5. Tighten nuts and bolts (1) uniformly so that there is no gap between the bucket and cutting edge. Tightening torque for mounting bolt: 883 to 1196 Nm (90 to 122 kgfm (651 to 882 ft/lbs)
6. Tighten the mounting bolts again after operating for several hours.

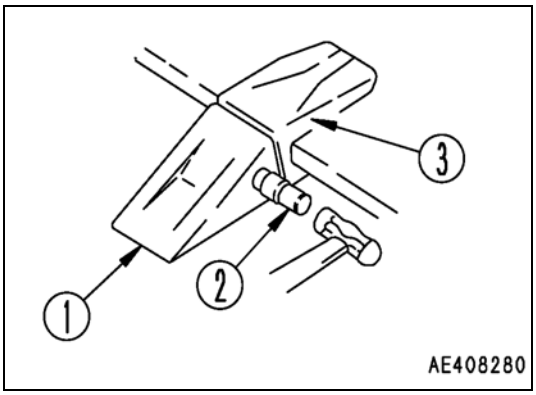


REPLACING BUCKET TEETH



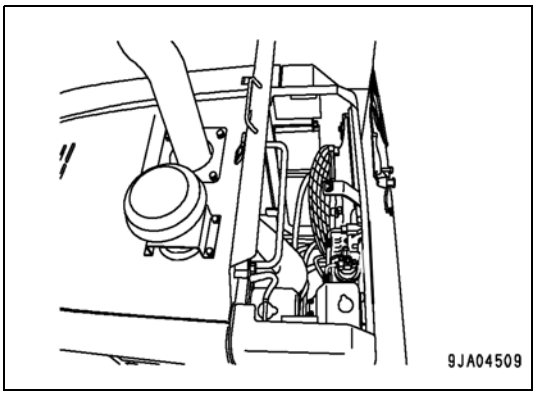
Replace the teeth before they wear down as far as the adapter.

1. Raise the bucket to a suitable height, then put blocks under the bucket to prevent the bucket from coming down. Raise the bucket so that the bottom surface of the bucket is horizontal.



2. Remove pin (2) installed to the bucket, then remove tooth (1). Put a rod (slightly narrower than the pin) in contact with the hatched portion (either left or right) and tap pin (2) out to the opposite side.
3. Install new tooth (1) in adapter (3), push in pin (2) partially by hand, then knock it in with a hammer.
4. After operating the machine for a few hours, check that the pin does not come out.

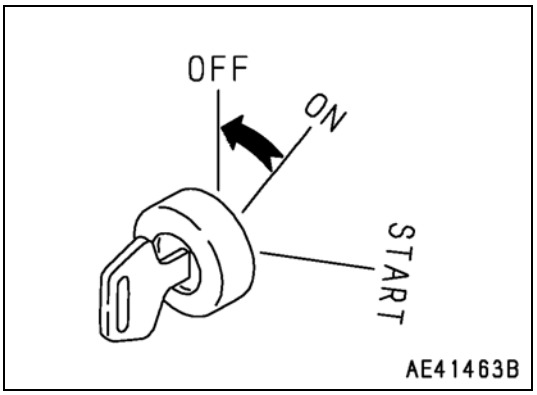
CHECKING AIR CONDITIONER



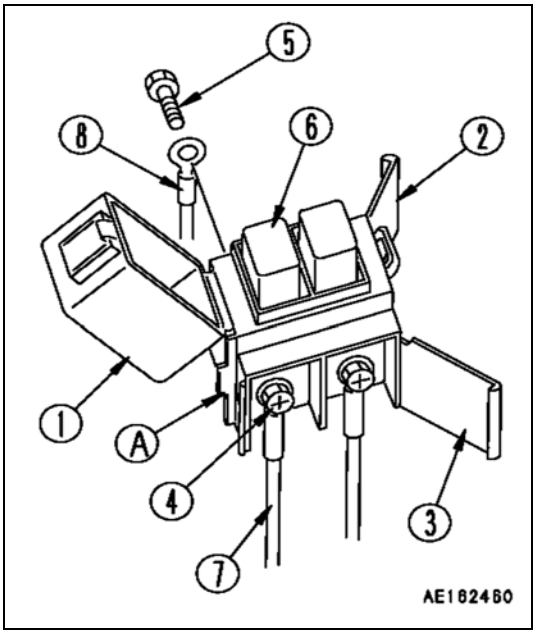
Inspect the condition of the air conditioning system, if any abnormality, leakage or the air conditioner is not working properly, contact you **Komatsu** dealer. Do not tamper with the air conditioning system.

REPLACING SLOW BLOW FUSE

Always turn the power **OFF** when replacing the slow blow fuse (turn the ignition switch to the “OFF” position). Always replace the slow blow fuse with a fuse of the same capacity.

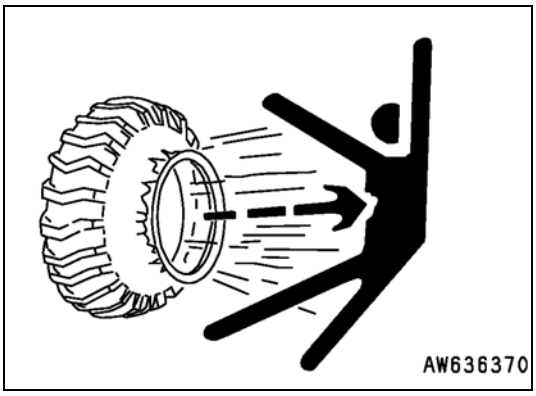


1. Turn the ignition switch to the “OFF” position.
2. Remove the slow blow fuse box from the chassis.



3. Open covers (1), (2), and (3) of the slow blow fuse box. Covers (2) and (3) can be removed easily by using protrusion (A) on the body as a fulcrum and levering the catch of the cover with a flat-headed screwdriver to release it.
4. Loosen screws (4) and (5), and remove. When screws (4) and (5) are removed, slow blow fuse 6 will also come off together with electric wiring (7) and (8).
5. Using screws (4) and (5), install a new slow blow fuse together with electric wiring 7 and 8 to the slow blow fuse box, then close covers (1), (2), and (3).
6. Install the slow blow fuse box to the chassis.

SELECTION AND INSPECTION OF TIRES



WARNING

If a tire or a rim is handled incorrectly, the tire may burst or may be damaged and the rim causing serious injury or death.

- **Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and skill, be sure to have a tire repair shop to carry out the work.**
- **Do not heat or weld the rim to which the tire is installed.**

SELECTION OF TIRES

WARNING

Select the tires according to the conditions of use and the weight of the attachments on the machine. Use only specified tires and inflate them to the specified pressure.

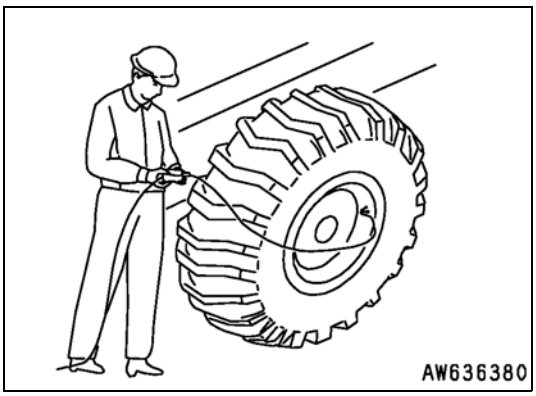
Select the tires according to the conditions of use and the weight of the attachments of the machine. Use the following table. Since the travel speed indicated on the speedometer varies with the tire size, consult your **Komatsu** Dealer when using optional tires.

		Maximum load [kg (lb)]	Tire size
Standard	Front and Rear	6,775 (14939)	20.5-25-12PR

WARNING

When inflating a tire, check to be sure no one will enter the working area. Use an air chuck which has a clip and which can be fixed to the air valve.

- **While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.**
- **If the rim does not fit normally, it may fail while the tire is inflated. To ensure safety, place a guard around the tire and do not work in front of the rim side of the tire.**
- **Be sure to observe the inflation pressure.**
- **Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-duty work.**



Measure the inflation pressure with a tire pressure gauge while the tires are cool before starting work.

INFLATION OF TIRES

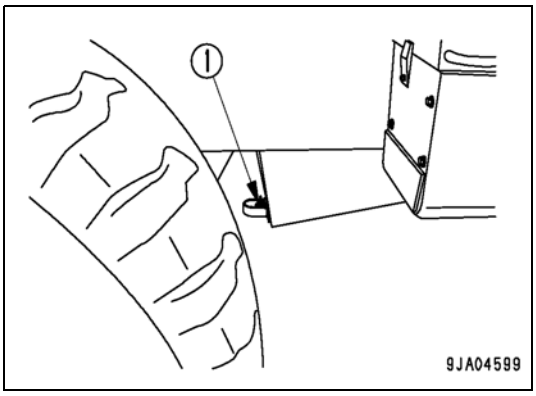
Adjust the inflation pressure properly. When inflating a tire, use an air chuck which can be fixed to the air valve of the tire as shown in the figure. Do not work in front of the rim but work on the tread side of the tire. The proper inflation pressure is shown below.

	Tire Size	Inflation Pressure
Standard	20.5-25-12PR	Front tire: 0.32 MPa (3.3 kgf/cm$_2$, 46.9 PSI) Rear tire: 0.27 MPa (2.8 kgf/cm$_2$, 39.8 PSI)

EVERY 50 HOURS SERVICE

DRAIN WATER, SEDIMENT FROM FUEL TANK

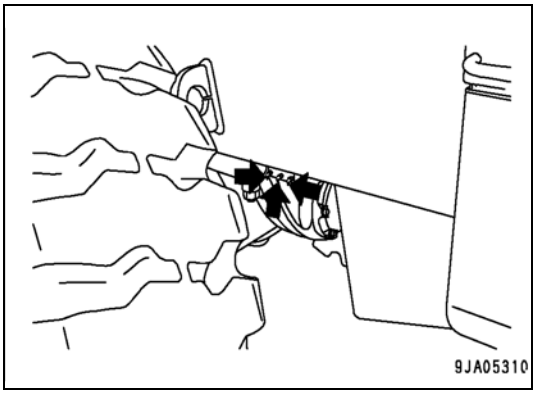
Loosen valve (1) on the left side of the tank so that the sediment and water will be drained together with fuel.



EVERY 100 HOURS SERVICE

Maintenance for every 50 hours service should be carried out at the same time.

LUBRICATING REAR AXLE PIVOT PIN



3 places

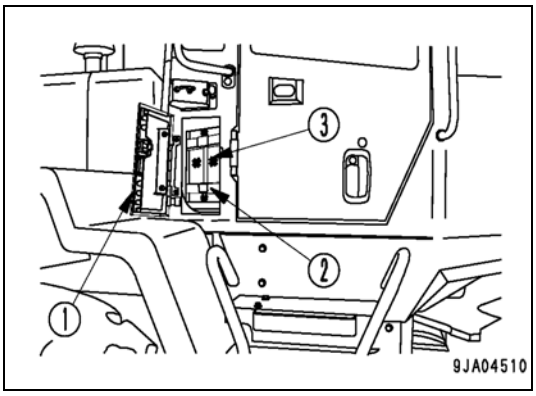
1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that was pushed out.

CLEANING FRESH AIR FILTER

⚠ WARNING

If compressed air is used, there is danger that dirt may fly and cause personal injury.
Always wear safety glasses, dust mask, and other protective equipment.

If the air conditioner has been used, the air filter should be cleaned. Stop the air conditioner before cleaning the element.



1. Open cover (1).
2. Remove bracket (2) and filter (3) as one unit.
3. Direct dry compressed air (less than 0.69 MPa 7 kgf/ cm^2, (99.4 PSI) to the element from inside along its folds, then direct it from outside along its folds and again from inside.
4. When installing, fit filter (3) into bracket (2), then install.

CHECKING OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠ WARNING

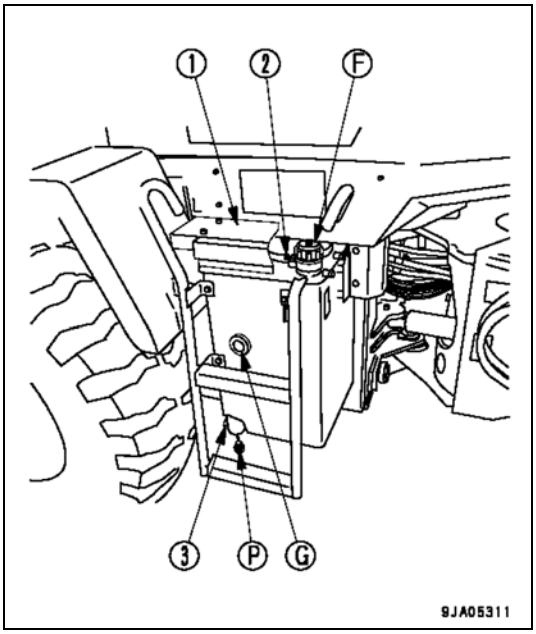
- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

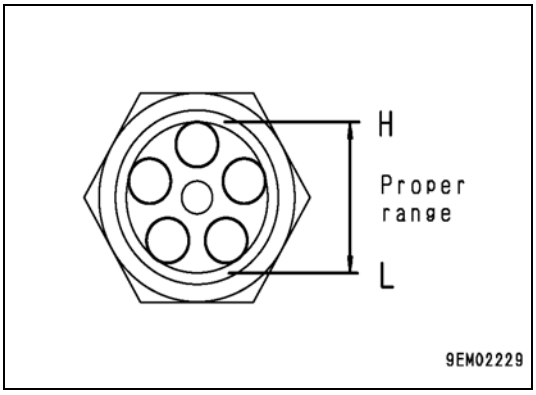
1. Lower the bucket to the ground and stop the engine. Wait for 5 minutes, then check sight gauge (G). The oil level should be between the H and L marks.

Remark

Do not add oil above the H line. This will damage the hydraulic circuit or cause the oil to spurt out. If oil is above the H level, stop the engine and wait for the hydraulic oil to cool down. Then place a container under the drain valve (3) to catch the oil, remove drain plug (P) and loosen drain valve (3) to drain the excess oil into the container.

2. If the oil is below the L level, add oil to the hydraulic tank as follows.
   A. Remove cover (1).
   B. Keep grip (2) pulled, then turn oil filler cap (F) counterclockwise and remove it.
   C. Refill the specified quantity of oil through oil filler (F).
   D. After adding oil, install oil filler cap (F) and cover (1).





EVERY 250 HOURS SERVICE

Maintenance for every 50 and 100 hours service should be carried out at the same time.

CHECK BATTERY ELECTROLYTE LEVEL

Carry out this check before operating the machine.

⚠ WARNING

- **Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may also cause an explosion.**
- **The battery generates flammable gas and there is danger of explosion, so do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.**
- **When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts of the machine.**

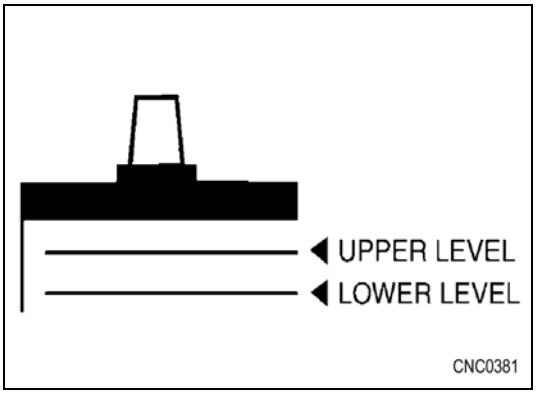
Remark

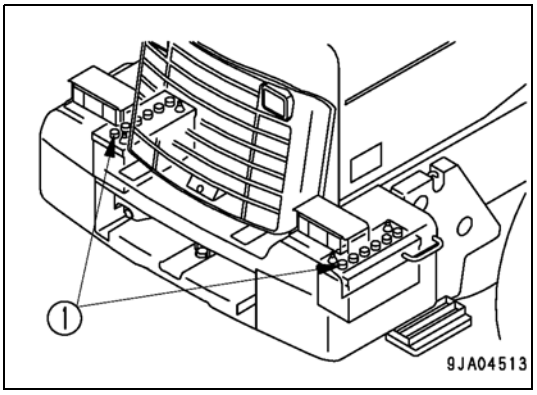
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open the cover of the battery box. There are two battery boxes: One on each side at the rear of the machine.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the “UPPER LEVEL” (U.L.) and “LOWER LEVEL” (L.L.) lines. If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.If the electrolyte level is below the midway point between the U.L. and L.L. lines, remove cap (1) and add distilled water to the U.L. line.
3. If distilled water has been added to any cell of cap (1), add distilled water also to the other cells.
4. Clean the vents of the battery caps, then close the caps securely. Keep the top of the battery clean and wipe it with a wet cloth.





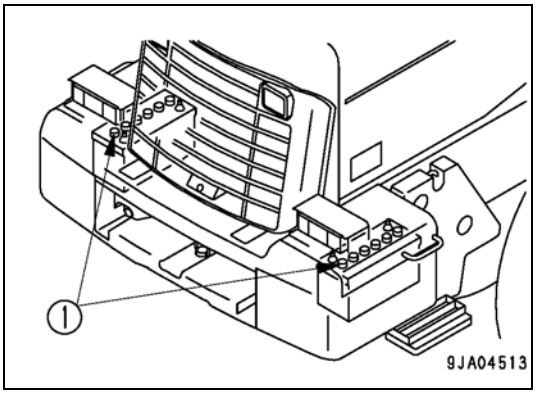
Remark

*If distilled water is added to above the U.L. line, use a syringe to lower the level to the U.L. line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult with your **Komatsu** Dealer or battery maker.*

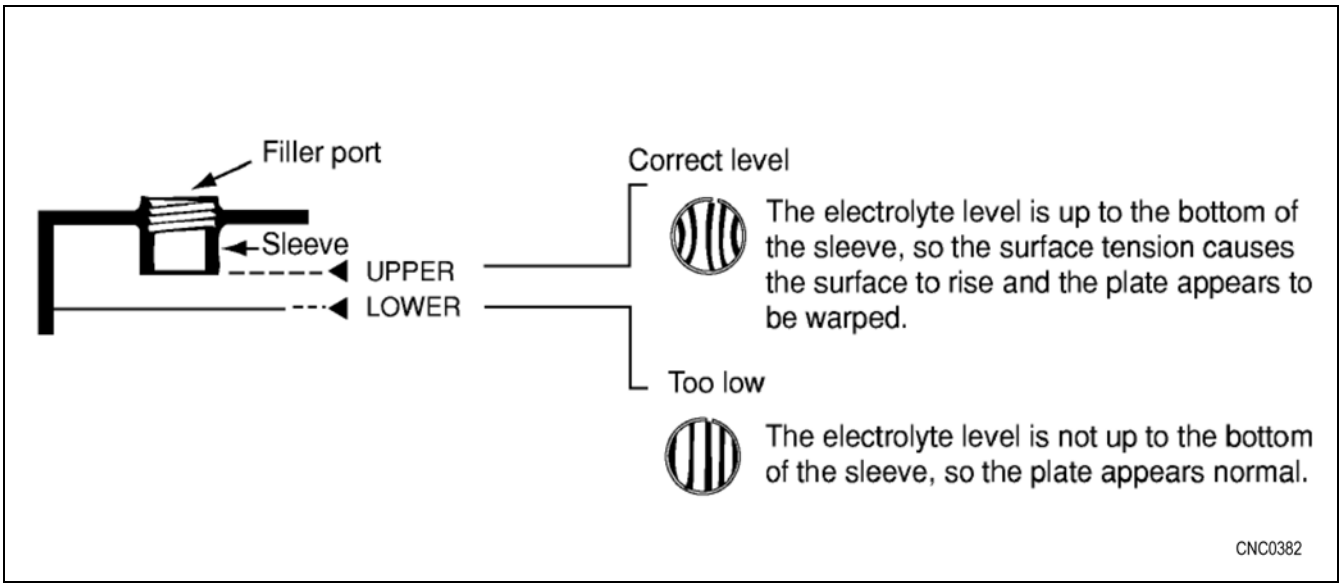
WHEN ELECTROLYTE LEVEL CANNOT BE CHECKED FROM THE BATTERY SIDE

If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the “UPPER LEVEL” line on the side of the battery, check as follows.

1. Open the cover of the battery box. There are two battery boxes: One on each side at the rear of the machine.
2. Remove cap (1) at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (“UPPER LEVEL” line) without fail.
3. If distilled water has been added to any cell of cap (1), add distilled water also to the other cells.



Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.

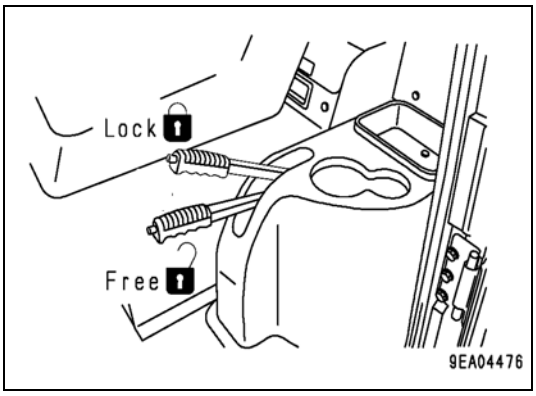


4. After adding distilled water, tighten cap (1) securely.

Remark

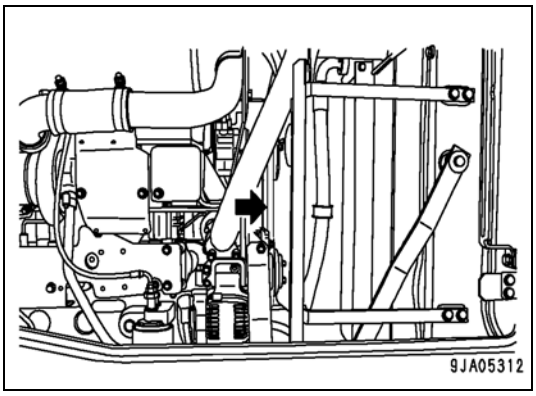
If distilled water is added to above the bottom of the sleeve, use a syringe to lower the level to the bottom of the sleeve. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult with your ***Komatsu*** *Dealer or battery maker.*

CHECKING PARKING BRAKE



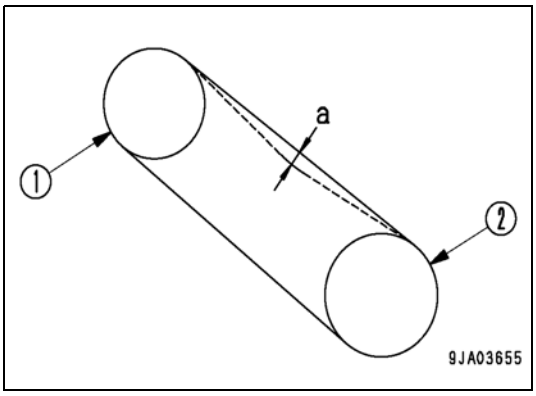
1. On dry downhill slopes, use the brake pedal to stop the machine.
2. Pull the parking brake lever fully to the **LOCK** position, and check if the parking brake can hold the machine in position.
3. If any abnormality is found, please contact your **Komatsu** Dealer.

CHECKING V-BELT TENSION/ADJUST



1. Open the engine side cover on the left side of the chassis.
2. Standard deflection between air conditioner compressor pulley (1) and fan pulley (2) when pressed with a thumb approx. 98 N 10 kg should be approx. 9.5 to 13.5 mm (0.4 to 0.5 in). When a belt tension gauge is used, the standard tension is within a range of 353 to 549 N (36 to 54 kgf).

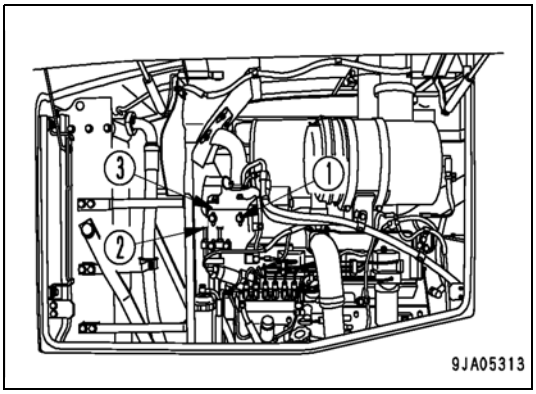
INSPECTION



Check each pulley for damage, wear in the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove. In case any of the following occurs, ask the **Komatsu** Dealer in your territory to replace the belts with new ones.

- The fan belt has elongated, leaving little allowance for adjustment.
- A cut or crack is found on the belt.
- Slipping or creaking sound is heard coming from the belt.
- When the new V-belt is set, readjust it after one hour of operation.

CHECK WHEN CHANGING THE V-BELT



The standard deflection between the air conditioner compressor pulley and fan pulley when pressed with a thumb (approx. 98 N) should be approx. 7 to 10 mm (0.28 to 0.4 in). When a belt tension gauge is used, the standard tension is within a range of 533 to 745 N.

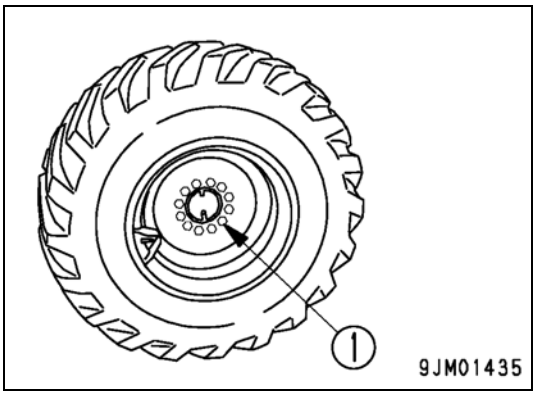
ADJUSTING

1. Open the engine side cover on the right side of the machine.
2. When adjusting, loosen 4 bolts (1), turn 2 adjustment bolts (2), and move bracket (3) and the compressor as one unit.
3. After adjusting, tighten bolt (1) and the locknut of bolt (2).

CHECKING FOR LOOSE WHEEL HUB BOLTS, TIGHTENING

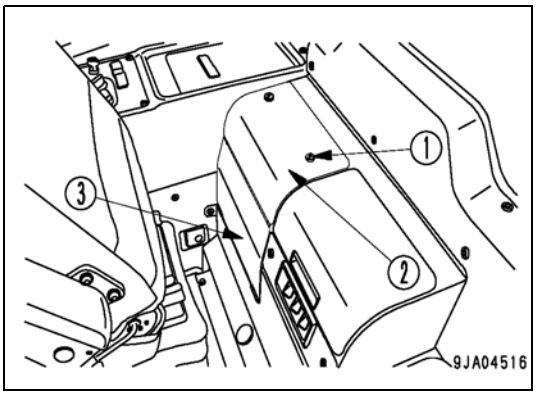
If wheel hub nuts (1) are loose, tire wear will be increased and may cause accidents.

1. Check for loose nuts, and tighten if necessary. When checking for loose nuts, always turn the nuts in the direction of tightening to check. Tightening torque: 824 to 1030 Nm 84 to 105 kgf²m (607.6 to 759.5 ft/lbs)
2. If any stud bolt is broken, replace all the stud bolts for that wheel.

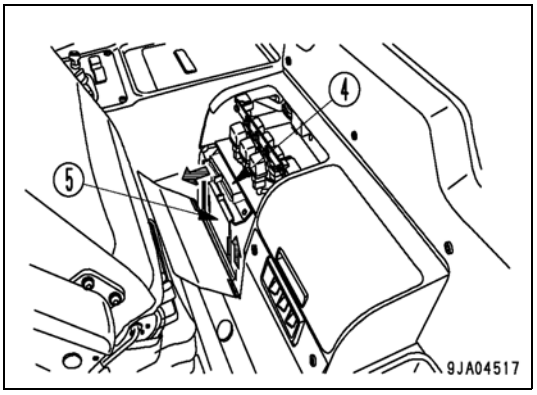


CLEANING A/C RECIRCULATION FILTER

1. Loosen knob (1), remove filter inspection cover (2), then open filter inspection cover (3).



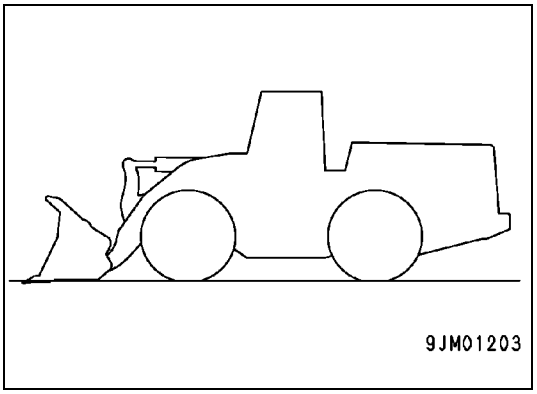
2. Pull out filters (4) and (5) in the direction of the arrow.
3. Clean with compressed air in the same way as for the fresh air filter. If the filter is extremely dirty, rinse it in water. After rinsing the filter, dry it completely before installing it again.



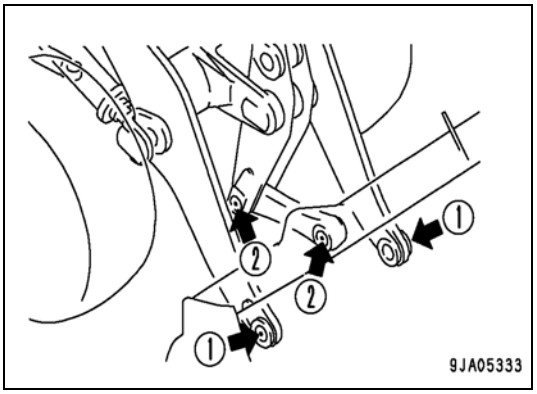
LUBRICATING WORK EQUIPMENT

On job sites where there is a lot of heavy-duty work, or on job sites where operations are carried out continuously for more than eight hours, reduce the greasing interval and carry out greasing more frequently.

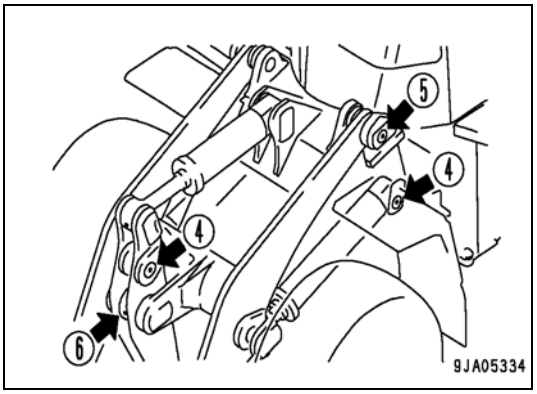
1. Place the work equipment horizontally in contact with the ground, then stop the engine.
2. Clean each fitting, then using a grease pump, pump in grease through the grease fittings marked by the arrows.
3. After greasing, wipe off any old grease that was pushed out.



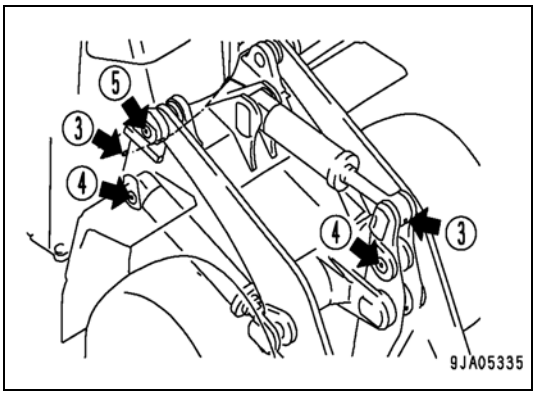
- (1) Bucket pin (2 places)
- (2) Bucket link pin (2 places)



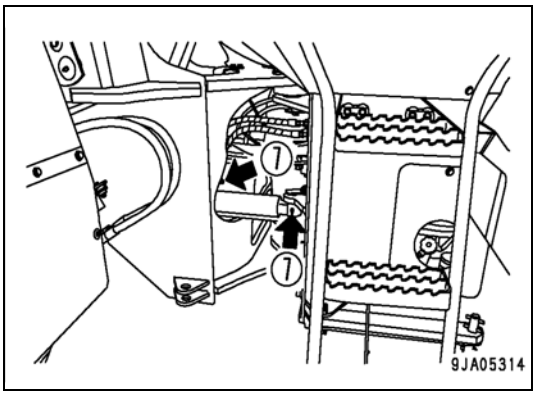
- (3) Dump cylinder pin (2 places)
- (4) Lift cylinder pin (4 places)
- (5) Lift arm pivot pin (2 places)

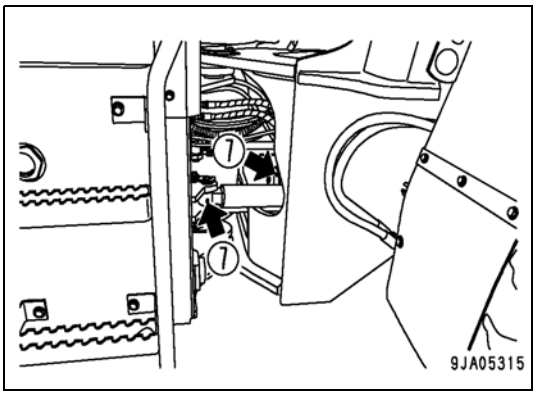


- (6) Tilt lever pin (1 place)



- (7) Steering cylinder pin (4 places)





EVERY 500 HOURS SERVICE

Maintenance for every 50, 100 and 250 hours service should be carried out at the same time.

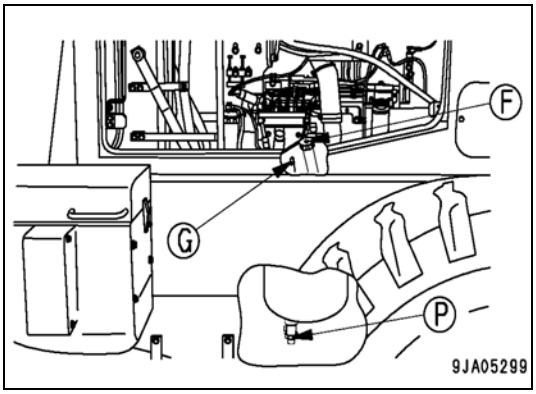
CHANGING ENGINE OIL AND OIL FILTER CARTRIDGE

WARNING

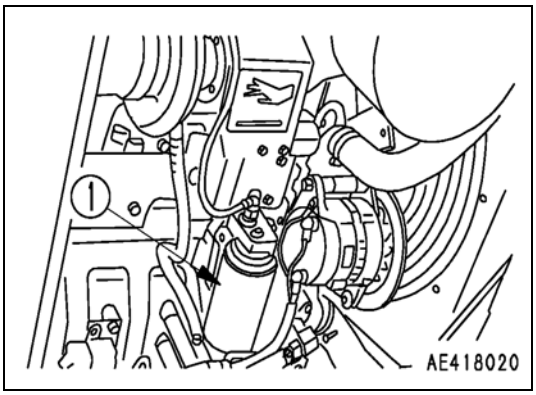
The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Refill capacity: 19.5 liters (5.15 US gal)
- Filter wrench

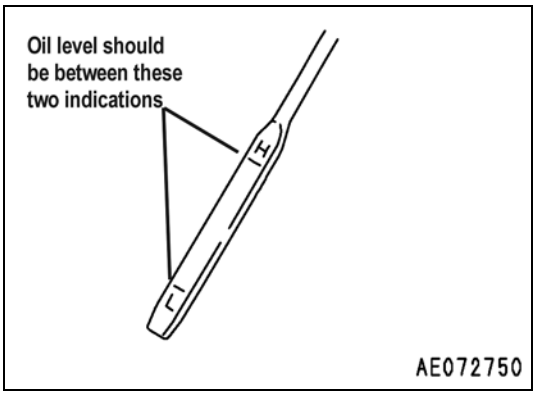
1. Open the engine side cover on the right side of the chassis.
2. Open oil filler (F).
3. Place a container to catch the oil under drain plug (P).
4. Loosen drain plug (P) and drain the oil. Be careful not to get oil on yourself.
5. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your **Komatsu** Dealer.
6. Tighten drain plug (P).



7. Open the engine side cover on the left side of the chassis.
8. Using the filter wrench, turn filter cartridge (1) counterclockwise to remove it.
9. Clean the filter holder, fill the new filter cartridge with engine oil, then coat the seal and thread of the filter cartridge with engine oil (or coat thinly with grease) and install.
10. When installing the seal, tighten it so its surface comes into contact with the filter holder, then tighten another 3/4 turn.



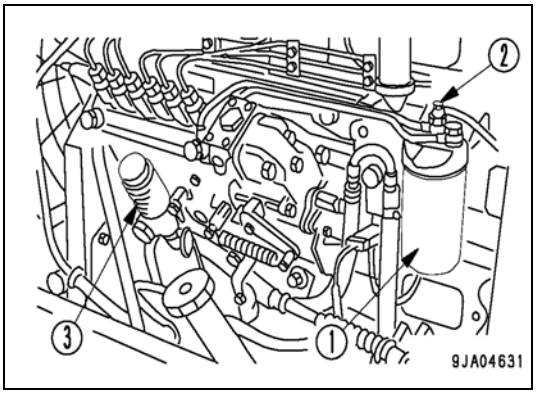
11. After replacing the filter cartridge, add oil through oil filler (F) until the oil level is between the H and L marks on the dipstick (G).
12. Run the engine at idling for short time, then stop the engine, and check that the oil is between the H and L marks on the dipstick. For details. See “CHECKS UNDER THE HOOD” (2-56).



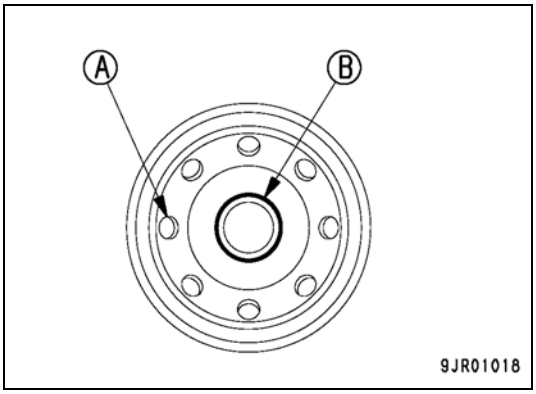
REPLACING ENGINE OIL FILTER CARTRIDGE

- Container to catch the oil
- Filter wrench

1. Open the engine side cover on the right side of the chassis.
2. Set the container to catch the fuel under the filter cartridge.
3. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.



4. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder. Add fuel from small hole (A) (dirty side) at eight places. Do not add fuel from hole (B) (clean side) at the center.



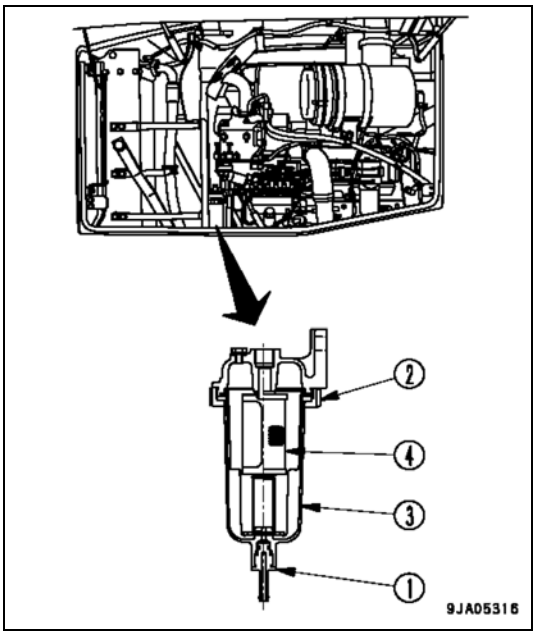
Remark

If the filter cartridge is tightened excessively, the packing will be damaged and fuel will leak. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.

5. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. an additional 1/2 turn.
6. Add fuel to the fuel tank until full (to “FULL” mark on the fuel gauge).
7. Loosen air bleed plug (2).
8. Loosen the knob of feed pump (3), then pump it up and down until no more bubbles come out with the fuel from air bleed plug (2).
9. After bleeding the air, tighten air bleed plug (2), then push in the knob of priming pump (3) and tighten it. Tightening torque for air bleed plug: 7.8 to 11.8 Nm (5.8 to 8.7 ft/lbs)
10. After bleeding the air, start the engine and check that there is no fuel leakage from the filter seal surface. If there is any leakage, check the tightening of the filter cartridge. If there is still leakage, follow Step 2 and 3 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the cartridge with a new part, then repeat Steps 4 - 7 to install the filter cartridge.

CLEANING WATER SEPARATOR STRAINER

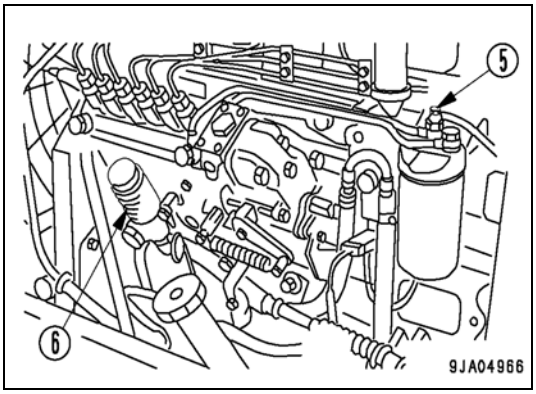
1. Open the engine side cover on the right side of the chassis.
2. Prepare a container to catch the drained fuel and set it under the water separator.
3. Loosen drain valve (1) at the bottom of the water separator and drain the fuel into the container.
4. Loosen ring nut (2), then remove cup (3).
5. Remove strainer (4) from the separator base.
6. Wash the interior of strainer (4) and cup (3) with clean fuel.
7. Check strainer (4) and replace it if it is damaged.
8. Clean the separator base and wash strainer (4), then install the strainer to the separator base.
9. Coat the threaded portion of ring nut (2) thinly with grease.
10. Fill cup (3) with clean fuel, install it to the separator base, then tighten it with ring nut (2). The specified tightening torque of ring nut (2): 37 to 43 Nm (27.5 to 31.8 ft/lbs) If the ring is loose, it will cause leakage of fuel, so always tighten it to the specified torque.



Remark

Be careful not to lose the O-ring, float, or spring. Be sure to assemble them after washing.

11. After installing filter cup (3), bleed air in the following manner.
12. Loosen air bleed plug (5) of the fuel filter.
13. Loosen the knob of feed pump (6), then pump it up and down until no more bubbles come out with the fuel from air bleed plug (5).
14. After bleeding the air, tighten air bleed plug (5), then push in the knob of priming pump (6) and tighten it. Tightening torque for air bleed plug: 7.8 to 11.8 Nm (5.8 to 8.7 ft/lbs)



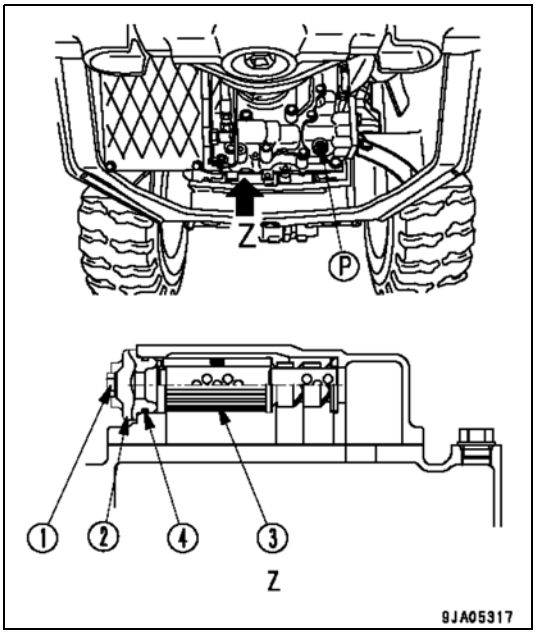
EVERY 1000 HOURS SERVICE

Maintenance for every 50, 100, 250 and 500 hours service should be carried out at the same

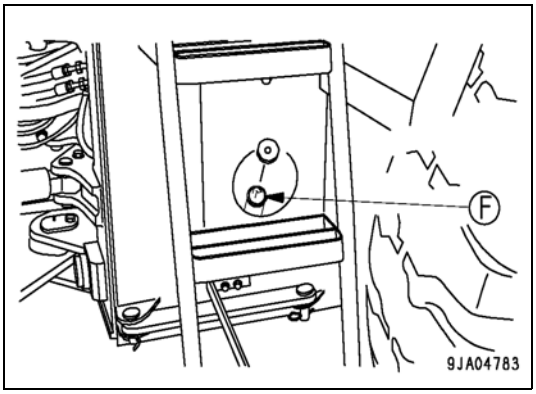
CHANGING OIL IN TRANSFER CASE

- Refill capacity: 6.5 liters (1.72 US gal)

1. Set a container to catch the oil under drain plug (P), then remove drain plug (P) and drain the oil. To prevent the oil from pouring out suddenly, loosen drain plug (P) and remove it gradually.
2. After draining the oil, install drain plug (P).
3. Loosen bolt (1), remove cover (2), then take out strainer (3).
4. Remove any dirt stuck to strainer (3), then wash it with clean diesel oil or flushing oil. If the strainer is damaged, replace it with a new part.
5. Replace O-ring (4) of cover (2) with a new part, then install.

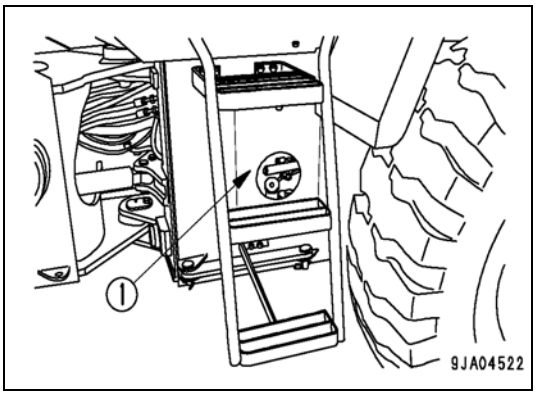


6. Refill the specified quantity of oil through oil filler (F).
7. After filling with oil, check that the oil is at the specified level.
8. Check that there is no oil leakage from the transfer case.

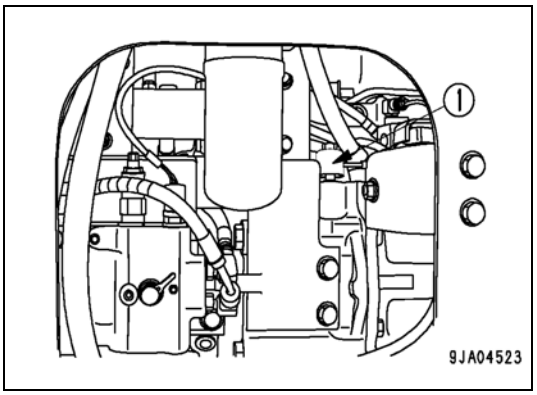


CLEANING TRANSFER CASE BREATHER

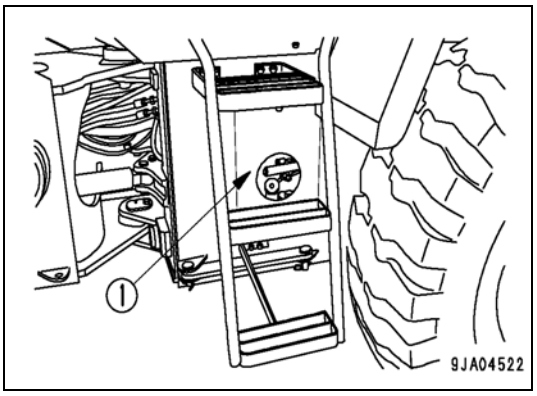
1. Remove cover (1).



2. Remove the mud and dirt from around the breather (2), then remove breather (2). After removing the breather, take steps to prevent dirt or dust from entering the mount.
3. Soak the breather (2) in washing liquid and wash it.



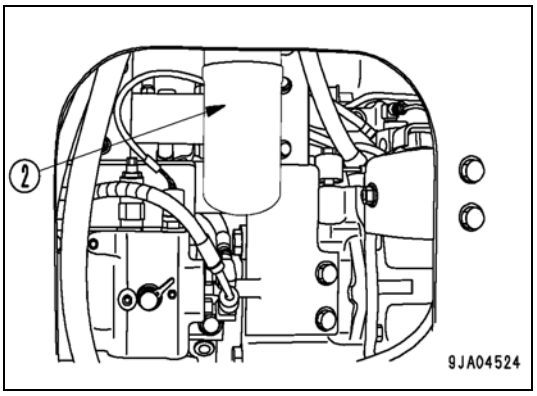
REPLACING HST OIL FILTER ELEMENT



WARNING

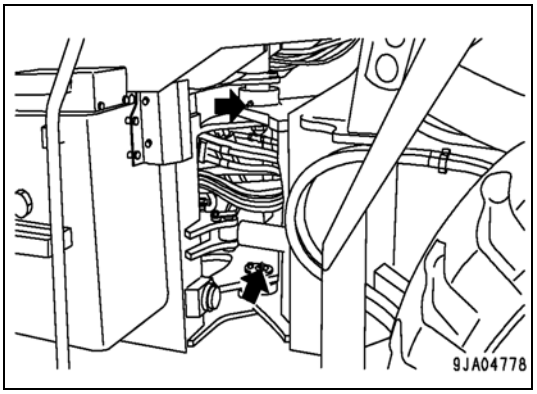
- **The parts and oil are at high temperature. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

1. Remove cover (1).

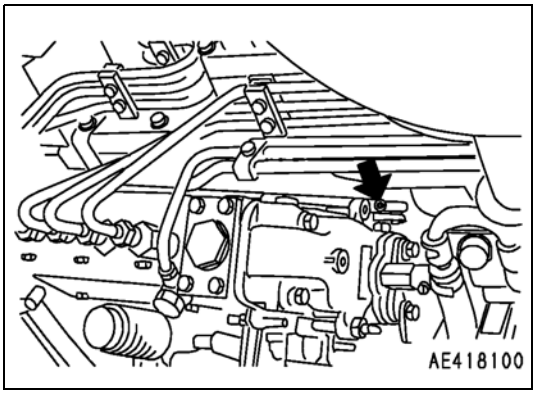


2. Using a filter wrench, turn filter cartridge (2) to the left to remove.
3. Install the new filter cartridge. Tightening torque: 29 to 39 Nm (21.7 to 28.9 ft/lbs)
4. Run the engine at low idling for 5 minutes to bleed the air from the HST circuit.
5. Check the hydraulic oil level.
6. Run the engine at low idling, and extend and retract the steering, bucket, and lift arm cylinders 4 to 5 times. Be careful not to operate the cylinder to the end of its stroke stop approx.100 mm (3.9 in) before the end of stroke.
7. Next, operate the steering, bucket, and lift arm cylinders to the end of their stroke 3 to 4 times, then stop the engine and loosen filler cap to bleed the air from the hydraulic tank. Check the hydraulic oil is at the specified level.
8. After completing the operation, install cover (2). Replace the HST filter element if the HST oil filter clogging warning pilot lamp lights up, even if 1000 hours or 1 year has not passed.

LUBRICATING CHASSIS



1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.



2. After greasing, wipe off any old grease that was pushed out.

- (1) Center hinge pin (2 places)
- (2) Engine stop solenoid linkage (1 place)

CHECKING PARTS OF TURBOCHARGER

Contact your **Komatsu** Dealer to have the turbocharger checked.

CHECKING PLAY IN TURBOCHARGER ROTOR

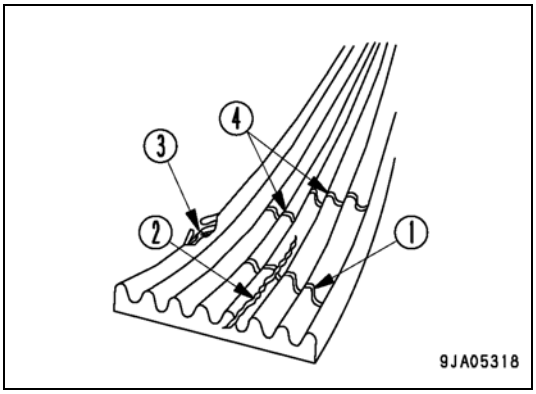
Contact your **Komatsu** Dealer to have the turbocharger checked.

CHECKING ALTERNATOR BELT TENSION, REPLACE

Since inspection and replacement of the fan belt require special tools, contact your **Komatsu** Dealer.

Remark

The machine is equipped with an auto tensioner, so there is no need to adjust the tension.



If the alternator drive belt is in the following condition, the belt must be replaced. Please ask your **Komatsu** Dealer to replace the belt.

- When horizontal scratch (1) crosses vertical scratch (2)
- When there are tears (3) in part of the belt

In case (4) where there are horizontal scratches only, there is no need to replace the belt.

EVERY 2000 HOURS SERVICE

Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

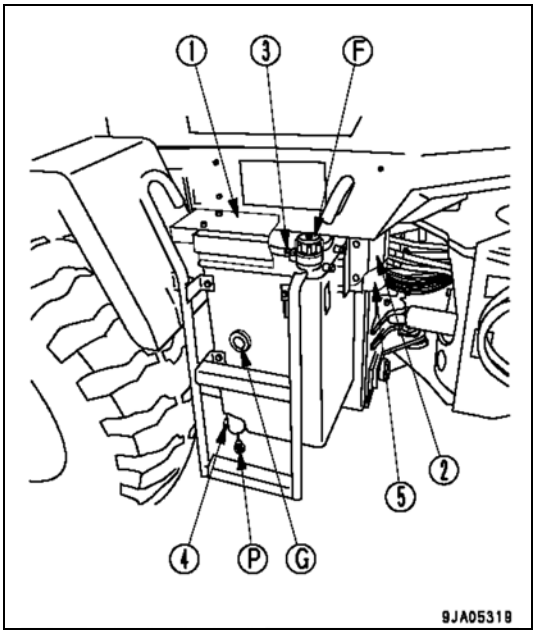
CHANGING HYDRAULIC OIL AND FILTER ELEMENT

⚠ WARNING

- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

- Refill capacity: 89 liters (25.51 US gal)

1. Lower the bucket horizontally to the ground and apply the parking brake, then stop the engine.
2. Remove covers (1) and (2).
3. Keep grip (3) pulled, then turn oil filler cap (F) counterclockwise and remove it.
4. Set a container to catch the oil under drain plug (P).
5. After removing drain plug (P), open drain valve (4) and drain the oil.
6. After draining the oil, close drain valve (4) and install drain plug (P).
7. Using a filter wrench, turn cartridge (5) to the left to remove it.
8. Clean the filter holder, fill the new filter cartridge with oil, then coat the seal and thread of the filter cartridge with oil (or coat thinly with grease) and install. When installing the seal, tighten it until its surface comes to contact with the filter holder, then tighten it 1/3 turn more.
9. Refill the specified quantity of oil through oil filler (F).
10. Check that the hydraulic oil is at the specified level. For details, See “CHECKING OIL LEVEL IN HYDRAULIC TANK” see page (3-32).
11. Run the engine at low idling, and extend and retract the steering, bucket, and lift arm cylinders 4 to 5 times. Be careful not to operate the cylinder to the end of its stroke (stop approx.100 mm (3.9 in) before the end of stroke).



Remark

If the engine is run immediately at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder will cause damage to the piston packing.

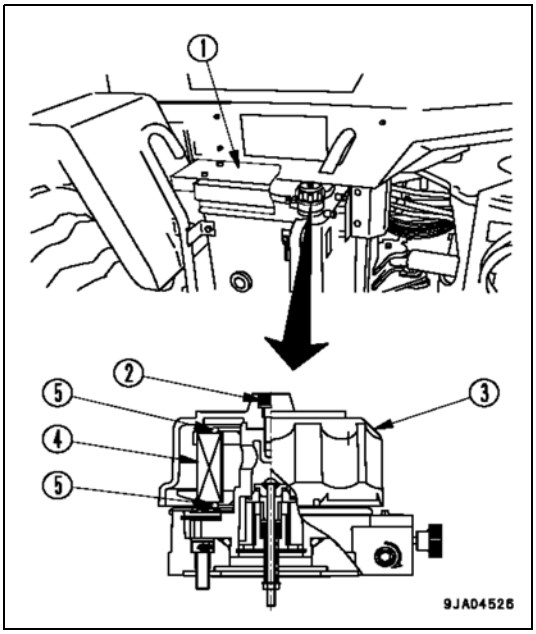
12. Next, operate the steering, bucket, and lift arm cylinders to the end of their stroke 3 to 4 times, then stop the engine and loosen filler cap to bleed the air from the hydraulic tank.
13. Check that the hydraulic oil level and add oil to the specified level. For details, See “CHECKING OIL LEVEL IN HYDRAULIC TANK” on page (3-32).
14. Next, raise the engine speed and follow the procedure in Step 12 to bleed the air. Repeat this process until no more air comes out.
15. After completing the air bleed operation, install cover (1) and (2).

REPLACING HYDRAULIC TANK BREATHER ELEMENT

⚠ WARNING

- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

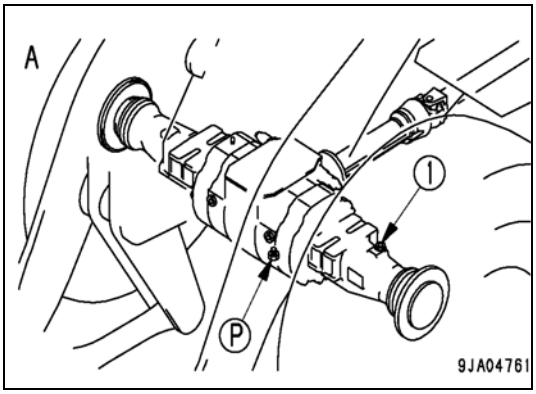
1. Remove cover (1).
2. Loosen bolt (2) at the top of the filler cap, then remove cap cover (3).
3. Remove element (4).
4. Coat O-ring (5) of the new element with grease, then install.
5. Align cap cover (3) with the grooves in the body, then tighten with bolt (2).
6. Install cover (1).



CHANGING AXLE OIL

- Refill capacity (front and rear, each): 24.0 liters (6.34 US gal)
- **A**: Front **B**: Rear

1. Place a container to catch the oil under drain plug (P).
2. Remove plug (1), then remove drain plug (P) to drain the oil. Remove the mud and dirt from around plug (1), then
3. remove the plug.

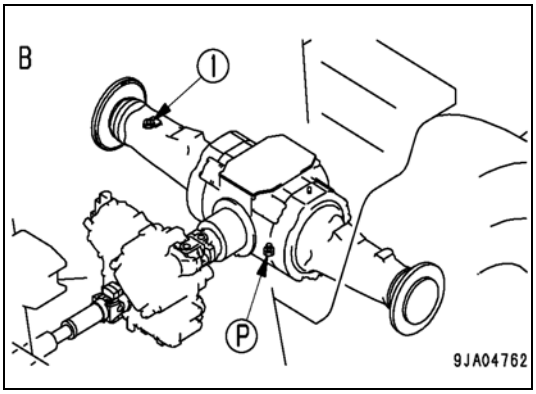


4. After draining the oil, clean drain plug (P) and install it again.
5. Add axle oil through plug hole (1) at the refill level.

Remark

For axles with ASD (Limited-Slip Differential), the brand of lubricating oil is different, always use the specified lubricating oil. For operations where the brake is used frequently, change the axle oil at shorter intervals.

6. After adding oil, check that the oil is at the specified level. For details, See “CHECKING AXLE OIL LEVEL” on page (3-23).



REPLACING AIR CONDITIONER RECIRCULATION AIR FILTER

Remove both the recirculation air filter and fresh air filter in the same way as when cleaning, and replace them with new parts. For details of cleaning the recirculation air filter, See “CLEANING AIR CONDITIONER RECIRCULATION FILTER” on page (3-36). For details of cleaning the fresh air filter, See “CLEANING FRESH AIR FILTER” on page (3-31).

CHECKING ALTERNATOR, STARTING MOTOR

Check for any problems, if problems are found contact your **Komatsu** Dealer to inspect the system.

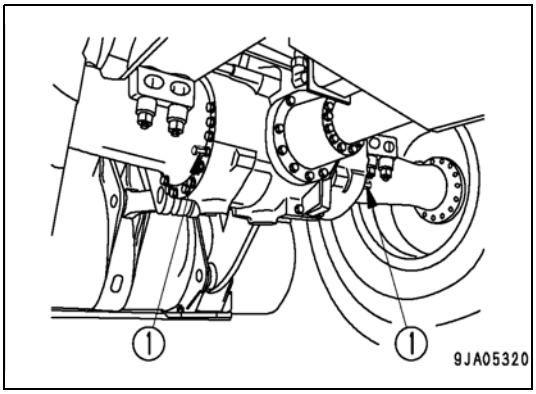
CHECKING ENGINE VALVE CLEARANCE, ADJUST

If engine valve train sounds nosey or engine is running rough contact your **Komatsu** Dealer to adjust the valves.

CHECKING BRAKE DISC WEAR

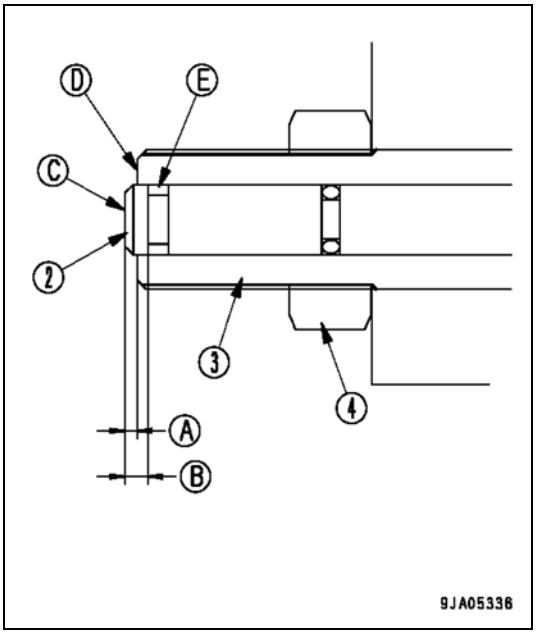
⚠ WARNING

- **When checking the brake disc wear, apply the parking brake and secure the front and rear frames with the safety bar.**
- **Make sure that the brake oil temperature is less than 60×C (140×F) before checking the brake wear.**
- **If the disc is near the wear limit, carry out inspection at shorter intervals, regardless of the specified inspection interval.**



When checking the brake disc for wear, there are 4 places (front axle and rear axle, left and right), so use the same procedure to check all 4 places.

1. Remove cap nut (1).
2. Depress the brake pedal, keep it depressed, and push in the rod (2) of the gauge until contacts the piston.
3. Wear (A) is the amount that end face (C) of rod (2) is protruding from end face (D) of guide (3). Measure the amount of protrusion. The point where groove (E) of the rod is level with end face (D) of the guide is permissible limit (B) for the disc wear. If this point has been reached, please ask your **Komatsu** Dealer to carry out inspection and replacement of the parts.
4. If the disc is near the wear limit, carry out inspection at shorter intervals, regardless of the specified inspection interval.
5. Install cap nut (1). Tightening torque: 29.4 to 39.2 Nm (21.7 to 28.9 ft/lbs)



Remark

On new machines, the position of the guide is adjusted so that the end face of rod (2) comes to the end face of guide (3). For this reason, do not loosen locknut (4) except when replacing the disc. Carry out the operation with two workers: one worker depresses the brake pedal and the other worker pushes in rod (2).

CLEANING AND CHECK TURBOCHARGER

If there is carbon or oil sludge around the blower impeller, it will lower the performance of the turbocharger or cause the turbocharger to fail. Contact your **Komatsu** Dealer to carry out inspection or repair if necessary.

CHECKING ACCUMULATOR GAS PRESSURE

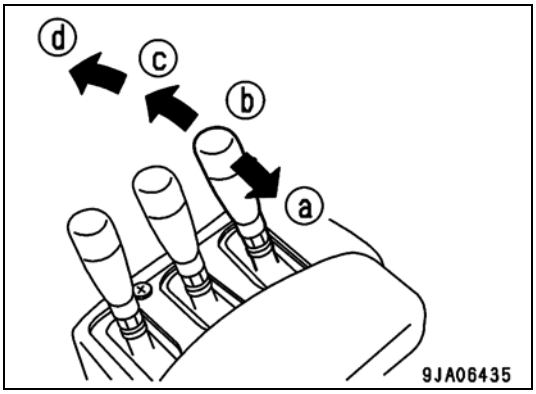
When carrying out the EVERY 2000 HOURS SERVICE or EVERY YEAR SERVICE or when making periodic replacement of the critical safety parts, contact your **Komatsu** Dealer to check the accumulator gas pressure.

CHECKING VIBRATION DAMPER

Check for cracks or peeling on the outside surface of the rubber. If any cracks or peeling are found, contact your **Komatsu** Dealer to have the parts replaced.

CHECKING FUNCTION OF ACCUMULATOR

PPC ACCUMULATOR



If the engine stops with the work equipment raised, and it is impossible to start the engine again, it is possible as an emergency measure to actuate the valve with the oil pressure stored in the accumulator and lower the work equipment to the ground.

1. Apply the parking brake.
2. Raise the work equipment to the maximum height, then operate the lift arm control lever to HOLD position (b).
3. Stop the engine.
4. Leave the work equipment lock lever in the FREE position.
5. Check that the area around the machine is safe, then operate the lift arm control lever to FLOAT position (d) and lower the work equipment to a point 1m above the ground.
6. When the lift arm comes to the 1m position, return the lift arm control lever to LOWER position (c), and lower the work equipment slowly to the ground.

Remark

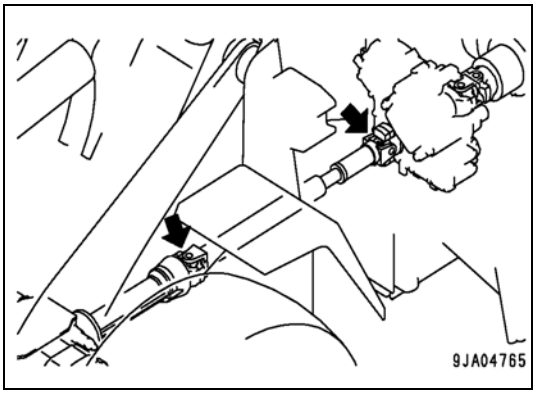
Carry out the check within 2 minutes after stopping the engine. If the machine is left with the engine stopped, the accumulator pressure will drop and it will be impossible to check the cause of the problem. If the work equipment stops while it is moving, the gas pressure

EVERY 4000 HOURS SERVICE

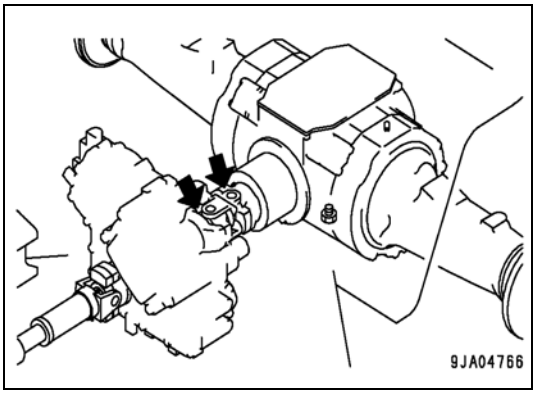
Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

LUBRICATING DRIVE LINE

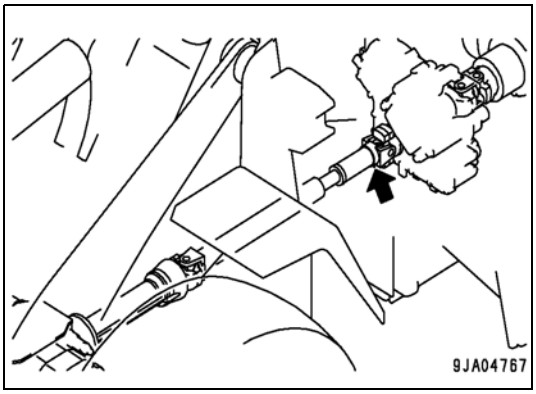
Using a grease pump, pump in grease through the grease fittings marked by the arrows. After greasing, wipe off any old grease that was pushed out.



1. Front drive shaft (2 places)
2. Rear drive shaft (2 places)



3. Drive shaft spline (1 place)



CHECK WATER PUMP

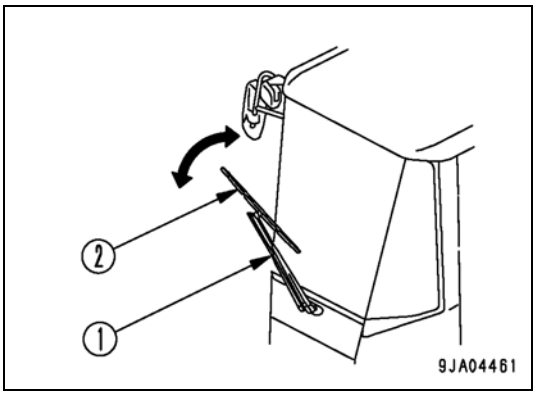
Check for play in the pulley or any grease leakage, coolant leakage, or clogging of the vent hole. If any abnormality is found, contact your **Komatsu** Dealer for repair or replacement.

ADDITIONAL SERVICE TIPS

Occasionally you may run into items that may need servicing out of the normal service hour times. Outlined are several items to be aware of when servicing the machine.

HANDLING CAB WIPER

When angling the wiper arm (1) to the front, check that the wiper blade is hanging free.



PREVENTING DAMAGE TO WIPER ARM BRACKET

When angling the wiper arm (1) to the front, to wipe the glass clean, if the wiper arm (1) is angled with the wiper blade (2) locked to the arm (the bottom of the blade is caught on the arm), abnormal force is brought to bear on the mounting bracket and the bracket may break.

ENGINE STARTING PROBLEMS

WHEN ENGINE CAN BE USED

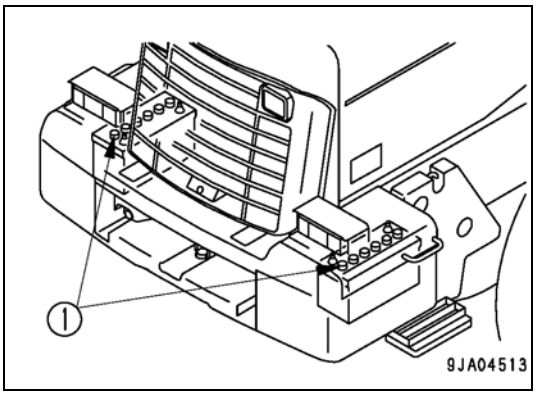
- If the transmission and steering wheel can be operated, and the engine is running, it is possible to tow the machine out of mud or to move it for a short distance to the edge of the road.
- The operator should sit on the machine being towed and operate the steering in the direction that the machine is towed.

WHEN ENGINE CANNOT BE USED

When towing a machine with the engine off, use the following procedure.

1. The transfer oil does not lubricate the system, so remove the front and rear drive shafts. If necessary, block the tires to pre vent the machine from moving.
2. The steering cannot be operated, so remove the steering cylinder.
3. Even if the brakes are in good condition, the brakes can only be used a limited number of times. There is no change in the operating force for the brake pedal, but the braking force is reduced each time the pedal is depressed.
4. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed. Connect one machine each to the front and rear of the machine being towed, then remove the blocks from the tires and tow the machine.

BATTERY SERVICING

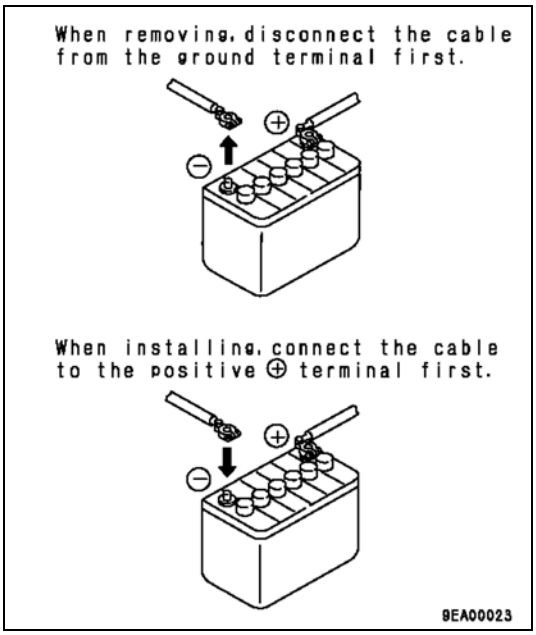


On occasion the battery may need immediate care due to age or weather conditions. Below is an outline relating to several instances that may occur during the life of the machine. The batteries are located at the rear of the machine in compartments (1).

IF BATTERY IS DISCHARGED

PRECAUTIONS

- When checking or handling the battery, stop the engine and turn the ignition switch key to the OFF position.
- The battery generates hydrogen gas, be careful there is a hazard 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, immediately wash it off with a large amount of water. If it gets in your eyes, wash it out with fresh water and consult a doctor.
- When handling batteries, always wear protective goggles and rubber gloves.
- When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal).
- When installing, install the positive (+) terminal first.
- If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
- When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.

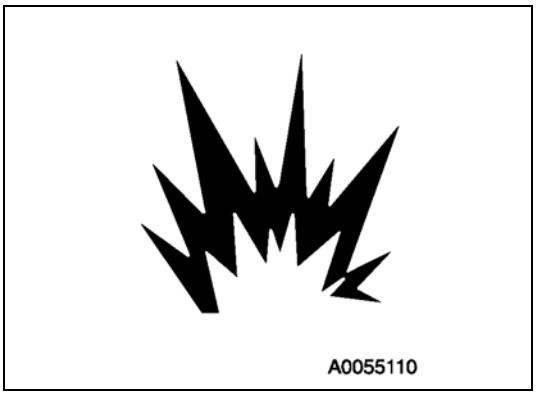


REMOVAL AND INSTALLATION OF BATTERY

1. Before removing battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the of the terminal and remove the wires from the battery.
2. After installing the battery, secure it in place. Tightening torque: 5.9 to 9.8 Nm (4.3 to 7.2 ft/lbs)
3. When installing the battery, connect the ground cable last. Install the battery cable and tighten the nut. Tightening torque: 5.9 to 9.8 Nm (4.3 to 7.2 ft/lbs)

PRECAUTIONS WHEN CHARGING THE BATTERY

When charging the battery, if the battery is not handled correctly, there is danger that the battery may explode. Always follow the instructions in the battery instruction manual and charger instruction.

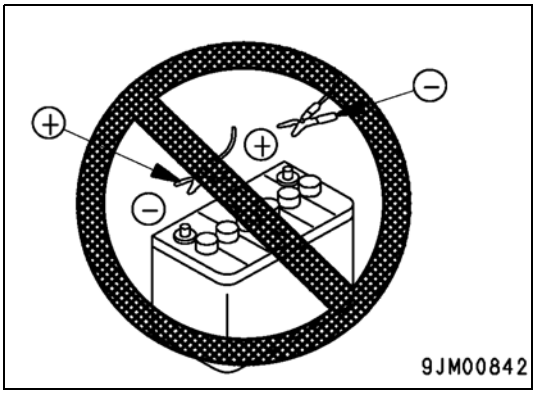


- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- Set the voltage of the charger to match the voltage of the battery to be charged. If the voltage is not selected correctly, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to attach the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery capacity. If the charger current is too high, the electrolyte will boil or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery electrolyte and cause the battery to explode.

STARTING ENGINE WITH BOOSTER CABLES

When starting the engine with a booster cable, do as follows:

PRECAUTIONS WHEN USING BOOSTER CABLES

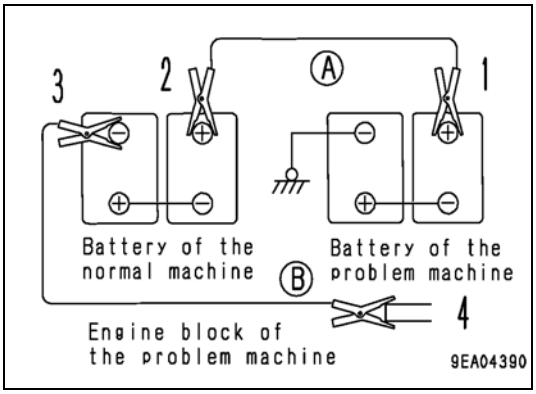


- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, always wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- When disconnecting the booster cable, take care not to bring the clips in contact with each other or with the machine body.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the safety lock levers and parking brake levers of both machines are in the **LOCK** position.
- Check that each lever is in the **NEUTRAL** position.

CONNECTING THE BOOSTER CABLES AND STARTING THE ENGINE

Keep the ignition switch of the normal machine and problem machine in the OFF position. Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Connect one clip of booster cable (A) to the positive (+) terminal of the problem machine.
2. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
3. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
4. Connect the other clip of booster cable (B) to the engine block of the problem machine.



STARTING THE ENGINE

WARNING

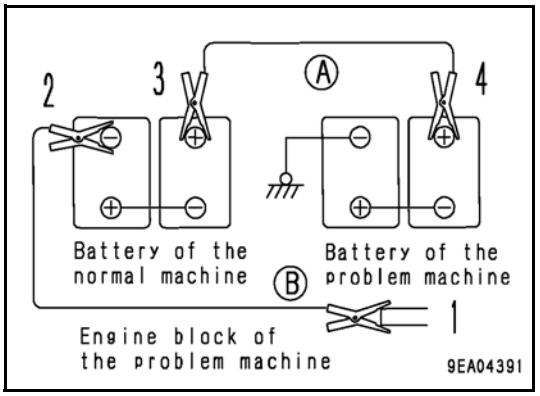
Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check that all the control levers are at the HOLD or neutral position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the ignition switch of the problem machine to the START position and start the engine. If the engine doesn't start at first, wait for at least 2 minutes before trying again.

DISCONNECTING THE BOOSTER CABLES

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

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



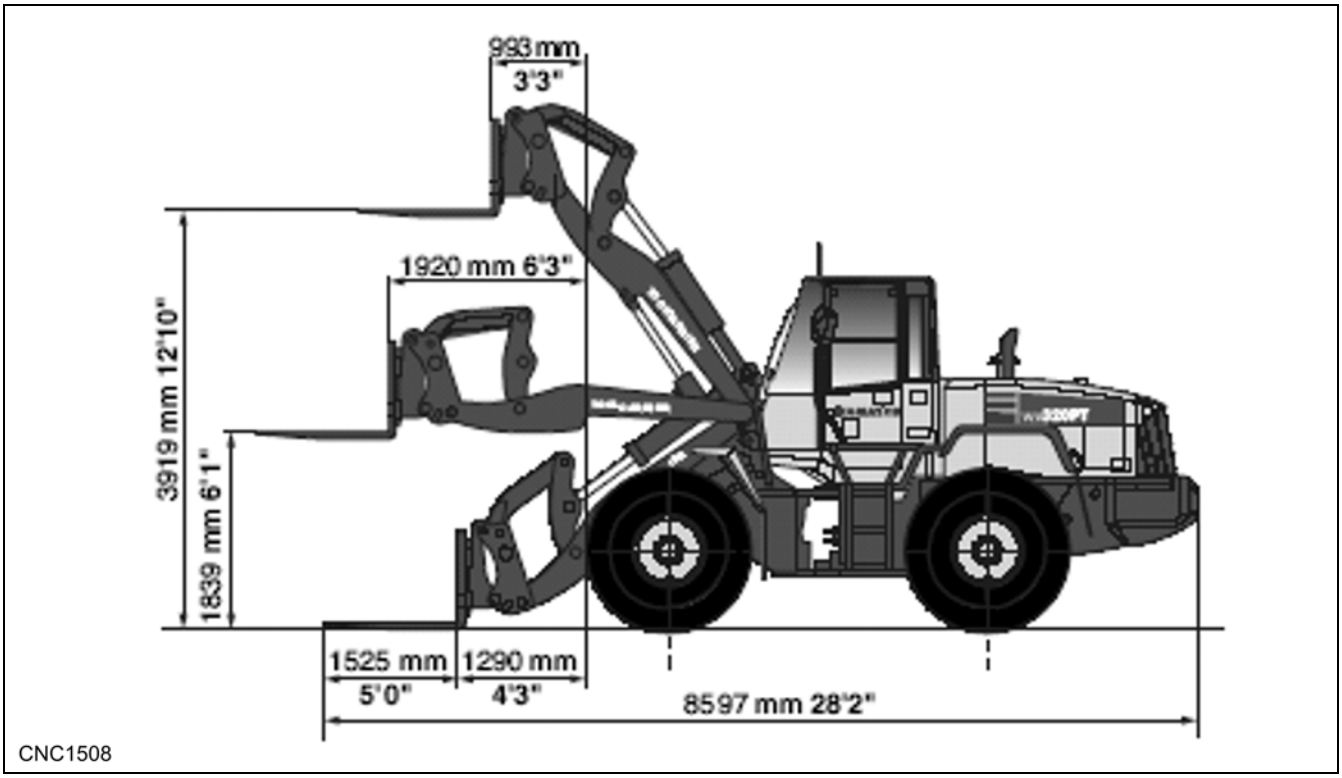
WARNING

Never use a welder or a machine with a higher voltage system to jump start the machine. Using a higher voltage to jump-start a machine may damage the machines electrical system or cause an unexpected explosion or fire. Always jump-start a machine with equal voltages

SPECIFICATIONS

TECHNICAL DATA

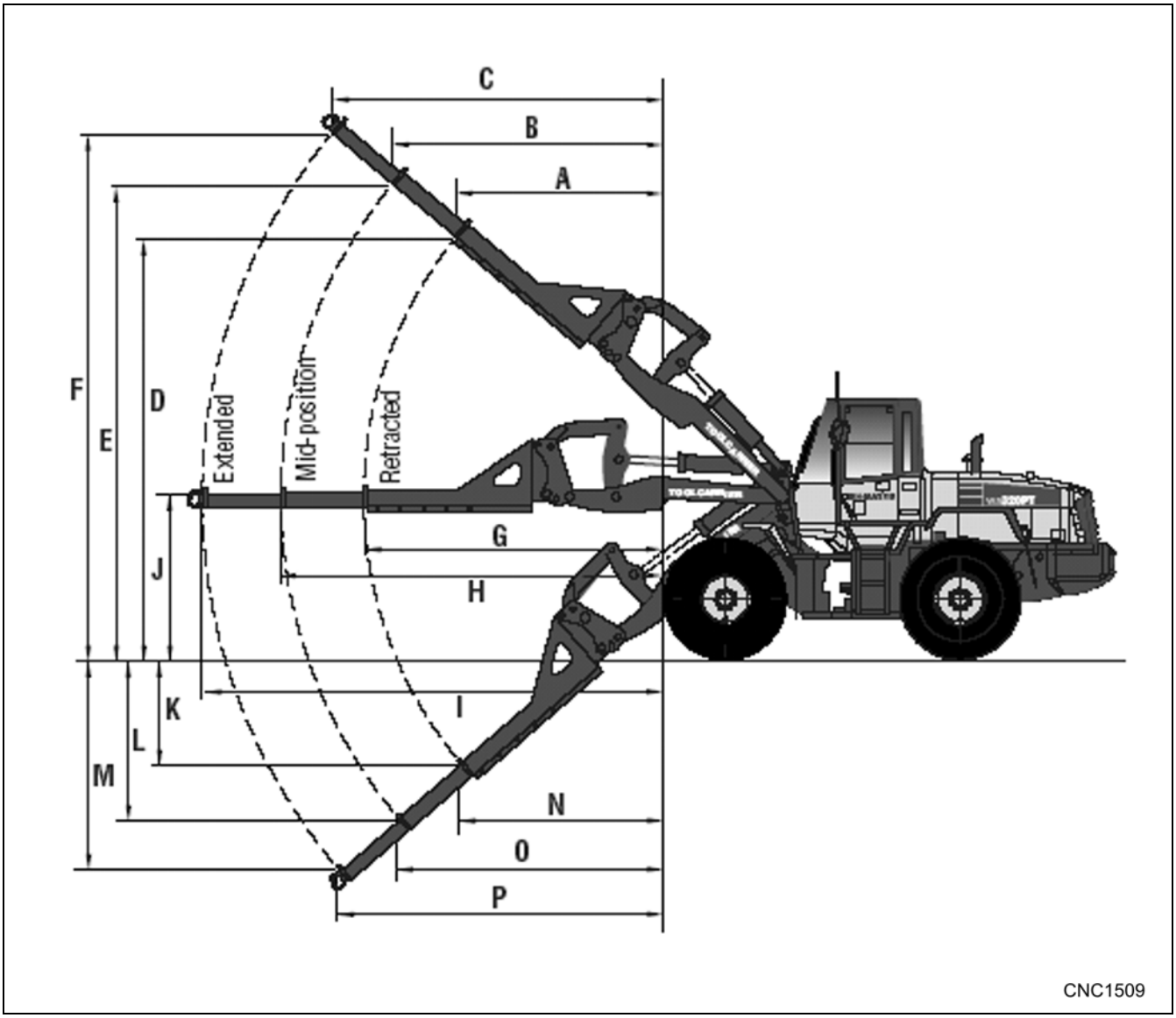
OVERALL DIMENSIONS WITH WORK EQUIPMENT ATTACHED



FORK LIFT KIT

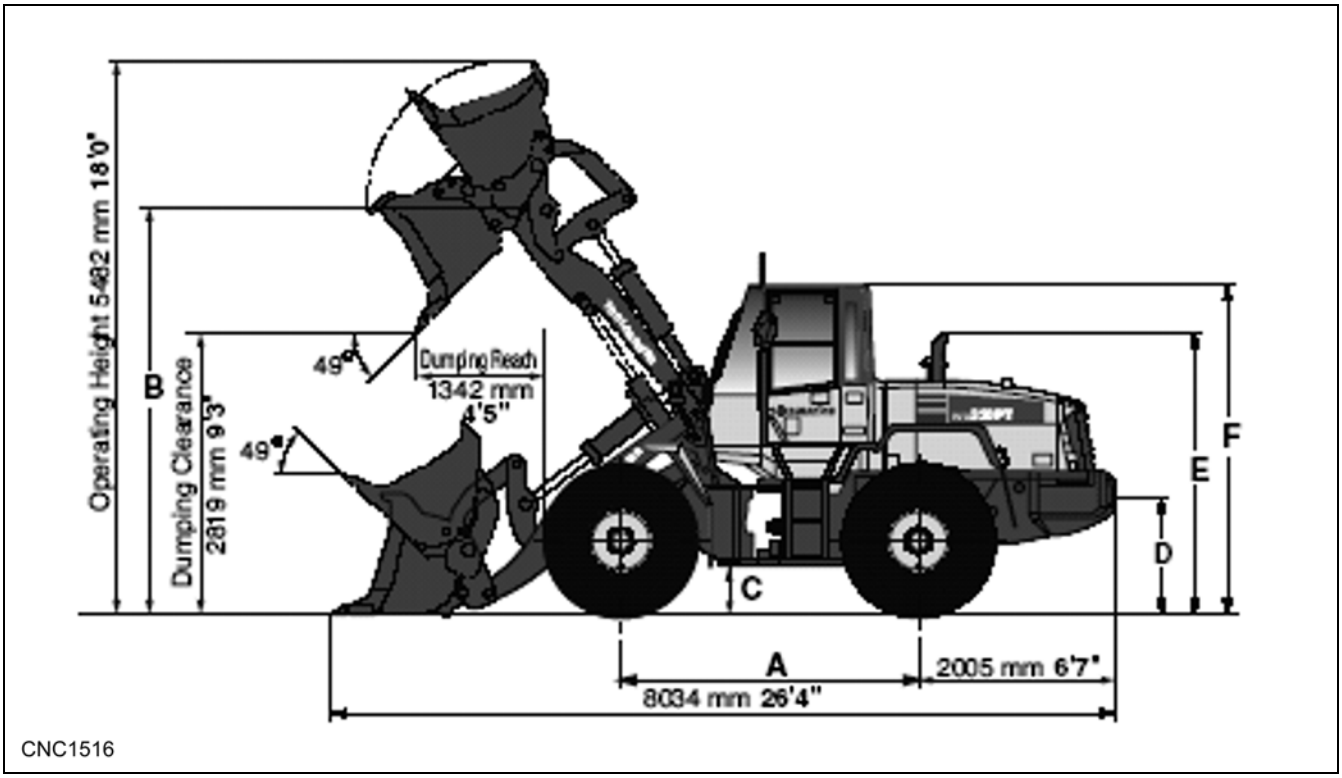
Static tipping load - boom level **Fork level, 610 mm (24 in)**	**Straight**	8290 kg	(18,276 lbs)
Load center	**Full turn (40°)**	7212 kg	(15,899 lbs)
Operating weight (including 1 operator: 75kg (165lbs) and forks		14588 kg	(32,161 lbs)
Fork tine length		1525 mm	(60 in)
Ground to top of tine at maximum lift		3919 mm	(12‘/10”)
Reach at maximum lift		993 mm	(3’/ 3”)
Ground to top of tine - boom and tine level		1839 mm	(6’/1”)
Reach boom and tine level		1920 mm	(6’/ 3”)
Overall length - tine level on ground		8597 mm	(28’/ 2”)
Operating load		3606 kg	(7,950 lbs)

★ For further information on using the fork lift. (See PARALLEL TOOL KIT 2-60)



MATERIAL HANDLING ARM

Boom Position	Retracted		Mid-position		Extended	
Reach, fully raised	**A**	2171mm (7’/1”)	**B**	2802mm (9’/2”)	**C**	3433mm (11’/3”)
Height, fully raised	**D**	4056mm (13’/3”)	**E**	4769mm (15’/8”)	**F**	5483mm (18’/0”0
Maximum reach	**G**	3998mm (13’/1”)	**H**	4950mm (16’/3”)	**I**	5902mm (19’/4”)
Height, maximum reach	**J**	2002mm (6’/7”)	**J**	2002mm (6’/7”)	**J**	2002mm (6’/7”)
Depth, below ground	**K**	1430mm (4’/8”)	**L**	2025mm (6’/8”)	**M**	2620mm (8’/7”)
Reach, below ground	**N**	2810mm (9’/2”)	**O**	3553mm (11’/8”)	**P**	4296mm (14’/1”)
Operating load	2581kg (5,690lbs)		2126kg (4,687lbs)		1809kg (3,988lbs)	
Tipping load, straight	5934kg (13,082lbs)		4888kg (10,776lbs)		4157kg (9,164lbs)	
Tipping load, 40^{o} full turn	5162kg (11,380lbs)		4252kg (9,374lbs)		3617kg (7,974lbs)	
Operating weight (including 1 operator: 75kg (165lbs) and material handling arm	14710kg (32,430lbs)		14710kg (32,430lbs)		14710kg (32,430lbs)	



LOADER BUCKET

Bucket type with bolt on cutting edge		**Stockpile**	
Bucket capacity	Heaped	2.65m^3	(3.5yd^3)
	Struck	2.2m^3	(2.9yd^3)
Bucket width		2740mm	(22,544lbs)
Static tipping load	Straight	10226kg	(22,544lbs)
	Full turn (40^o)	8896kg	(19,612lbs)
Operating weight (including 1 operator: 75kg (165lbs) and bolt on cutting edge		15425kg	(34,010lbs)
Bucket weight		980kg	(2,160lbs)
Dump clearance, maximum height and 49^o dump angle		2819mm	(9’/3”)
Reach at 2130mm (7in) and 49^o dump angle		1898mm	(6’/2”)
Reach with boom/bucket level		2862mm	(9’/4”)
Operating height fully raised		5482mm	(18’/0”)
Overall length	Bucket on ground	8034mm	(26’/4”)
	Bucket at carry	7842mm	(25’/8”)
Digging depth	0^o	112mm	(4’/4”)
	10^o	350mm	(1’/2”)
Breakout force		128kN	(28,570lbs)

Standard tire 20.5/25-12PR (L2)

Tread 2050mm (6’/9”)

Width over tires 2589mm (8’/6”)

A) Wheel base 3030mm ((9’/11”)

B) Hinge pin height, maximum height 4035mm (13’/3”)

C) Ground clearance 425mm (1’/5”)

D) Hitch height 1095mm (3’/7”)

E) Overall height, Top of stack 2775mm (9’/1”)

F) Overall height, ROPS cab 3200mm (10’/6”)

BASIC MACHINE SPECIFICATIONS

WEIGHT CHANGES

	Change in Operating Weight		Change in Tipping Load				Width Over Tire		Ground Clearance		Change in Vertical Dimensions	
			Straight		Full Turn							
20.5/25-12PR (L3) (tire size)	160 kg	353 lb	120 kg	265 lb	104 kg	229 lb	2585mm	8”/6”	425mm	1’/5”	0mm	0”
Install ROPS canopy (instead of cab)	-150 kg	-331 lb	-107 kg	-239 lb	-93 kg	-205 lb	N/A	N/A	N/A	N/A	N/A	N/A

ENGINE

Model . . . . . **Komatsu SAA6D102E-2**
Type . . . . . Water-cooled, 4-cycle
Aspiration . . . . . Turbocharged, and air-to-air after cooled
Number of cylinders 6
Bore x stroke . . . . . 102 mm x 120 mm **4.0" x 4.7"**
Piston displacement . . . . . 5.98 ltr **359 in3**
Governor . . . . . Mechanical, all-speed control

- Horsepower rating @ 2000 rpm (SAE J1349)

Gross horsepower . . . . . 127 kW **170 HP**
Net horsepower . . . . . 124 kW **166 HP**

- Tier 2, EU and Japan emissions certified

Fuel system . . . . . Direct injection

- Lubrication system

Method . . . . . Gear pump, force-lubrication
Filter . . . . . Full-flow
Air cleaner . . . . . Dry-type with double radial-sealed elements and dust evacuator, plus dust indicator

TRANSMISSION

Transmission . . . . . Hydrostatic, 1 pump, 2 motors with speed range select

Travel Speed	Forward		Reverse	
1st.	4.0 - 13.0 km/hr.	2.5 - 8.1 mph.	4.0 - 13.0 km/hr.	2.5 - 8.1 mph.
2nd.	13.0 km/hr.	8.1 mph.	13.0 km/hr.	8.1 mph.
3rd.	18.0 km/hr.	18.0 mph.	18.0 km/hr.	18.0 mph.
4th.	38.0 kn/hr.	23.6 mph.	38.0 kn/hr.	23.6 mph.

★ Measured with 20.5/25 (L2) tires
★ 1st. speed range can be set variably

AXLES AND FINAL DRIVES

Drive system	Four-wheel drive
Front	Fixed, semi-floating
Rear	Center-pin support, semi-floating 30° total oscillation
Reduction gear	Spiral bevel gear
Differential gear	Torque proportioning
Final reduction gear	Planetary gear, single reduction

BRAKES

Service brakes	Hydraulically-actuated, wet multi-disc brakes actuate on four wheels
Parking brake	Wet, multi-disc brake on transfer output shaft
Emergency brake	Independent service brake system (front and rear)

STEERING SYSTEM

Type	Orbital, full-hydraulic power steering independent of engine rpm
Steering angle	40° each direction
Minimum turning radius at the center of outside tire	5160 mm **16'11"**

SERVICE REFILL CAPACITIES

Cooling system	18.5 ltr **4.8 U.S. gal**
Fuel tank	228.0 ltr **60.2 U.S. gal**
Engine	19.5 ltr **5.2 U.S. gal**
Hydraulic system	89.0 ltr **23.5 U.S. gal**
Axle (each, front and rear)	24.0 ltr **6.3 U.S. gal**
Transfer	6.5 ltr **1.7 U.S. gal**

RECOMMENDED LUBRICANTS

When using commercially available oils other than Komatsu genuine oil, or when checking the latest specifications, refer to the Komatsu web page or consult your Komatsu distributor. See the following table:

No.	Supplier	Engine Oil [CD or CE] SAE 10W, 30, 40 10W 30, 15W 40 (The 15W 40 oil marked ✻ is CE)	Gear Oil [GL-4 or GL-5] SAE 80, 90, 140	Grease [Lithium-Based] NLGI No. 2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT (Winter, one season type)
2	AGIP	Diesel sigma S super diesel multi grade ✻ Sisma turbo	Rotra MP	GR MU/EP	-
3	AMOCO	✻ Amoco 300	Multi-purpose gear oil	PYKON premium grease	-
4	ARCO	✻ Arcofleet S3 pius	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	✻ RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	✻ Turbomax ✻ RX super CDR	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	✻ Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	✻ Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 ✻ Essolube XD-3 ✻ Essolube XD-3 Extra ✻ Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil ✻ Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Anti-freeze and coolant
13	MOBIL	Delvac 1300 ✻ Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	-

14	PENNZOIL	✻ Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease705 707L White-bearing grease	Anti-freeze and summer coolant
15	PETROFIN E	FINA Kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimura X	Spirax EP Spirax heavy duty	Albania EP grease	-
17	SUN	-	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco anti-freeze and summer coolant
18	TEXACO	✻ Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Coda 2055 startex antifreeze coolant
19	TOTAL	Rubia S ✻ Rubia X	Total EP Total transmission TM	Multis EP2	Antigal/antifreeze
20	UNION	✻ Guardol	MP gear lube LS	Unoba EP	-
21	VEEDOL	✻ Turbostar ✻ Diesel star MDC	Multigear Multigear B Multigear C	-	Anti-freeze

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 work location.

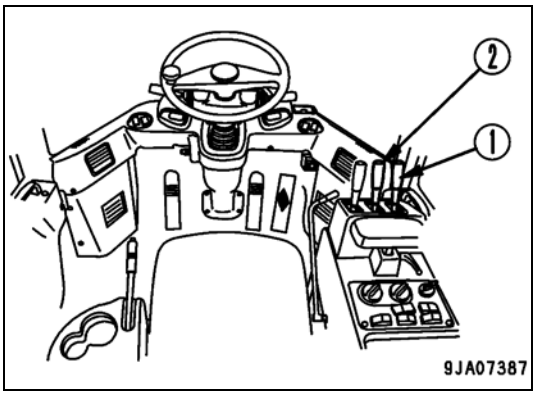
SELECTING BUCKET AND TIRES

Select the most suitable bucket and tires for the type of work and the ground conditions on the job site.

Type of work	Bucket	Ground conditions	Tire
Loading and carrying material	Stockpile bucket (with bolt-on cutting edge) 2.5m^3 (3.3 cu. yd)	General ground clearances	20.5-25-12PR (L3 Rock)
		Leveled ground	20.5-25-12PR (L2 Traction)
		Soft ground	20.5-25-12PR (L2 Traction)

USING LOADER WORK EQUIPMENT

Lift arm control lever (1) and bucket control lever (2) can be used to operate the lift arm and bucket as follows.



Basic Precautions

- When using the loader for any loading, digging or grading operations avoid any wheel slippage, this will damage the tires.
- Keep in mind the higher you go with the bucket loaded or unloaded the higher you will force the center of gravity on the machine. Doing so makes the machine less stable.
- Never use the float feature when traveling forward with the machine.
- Never use the float feature to lower the bucket.

⚠ WARNING

- **Never raise the boom with the bucket fully loaded and the machine articulated. There is danger that the machine may tip over.**
- **When the machine is traveling or the work equipment is raised, the activation of the E.C.S.S. switch (if equipped) will cause the work equipment to move.**
- **If operations are carried out with the E.C.S.S. switch (if equipped) in the ON position, and the travel damper switch is turned ON, the work equipment will move.**

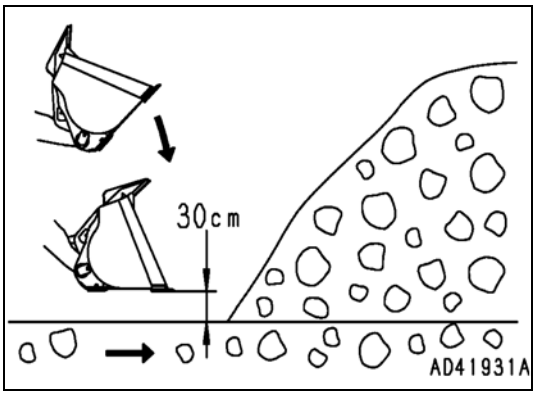
LOADING PILED SOIL OR BLASTED ROCK

When loading piled soil or blasted rock, operate the machine as follows. To prevent cutting the tires caused by the tire slipping, be aware of the following points during the operation.

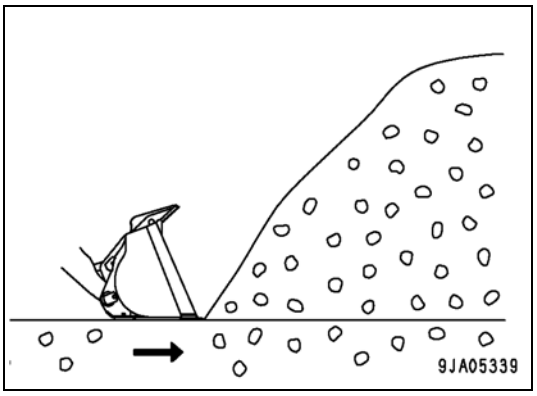
- Always keep the operating job site flat, and remove any fallen rocks.
- When working with stockpiles, operate the machine in 1st or 2nd speed range; when loading blasted rock operate the machine in 1st speed range.
- When performing loading operations always keep the machine frame angle perpendicular to the load. Never load the bucket with the machine frame articulated.
- Never use the steering to break out material.
- Avoid stalling the hydraulics when performing loading operations. Always maintain a continuous motion.

1. Stop with the bucket about 30 cm (12 in) from the ground, then lower it slowly to the ground.

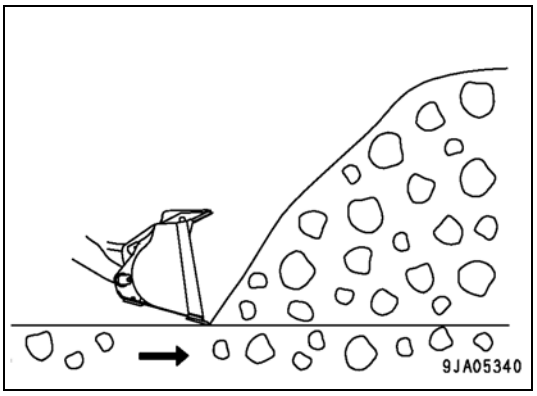
2. Shift down to the lower speed ranges. When completing the down shift, fully depress the left brake pedal and at the same time using the accelerator pedal increase the engine RPM.



3. **When The Material Is Stockpiled:**
   Keep the cutting edge of the bucket at a horizontal angle, using the inching brake pedal in combination with the accelerator pedal, increase the RPM while slowly releasing the left brake pedal as you proceed into the pile slowly with the bucket bottom edge flat on the ground.



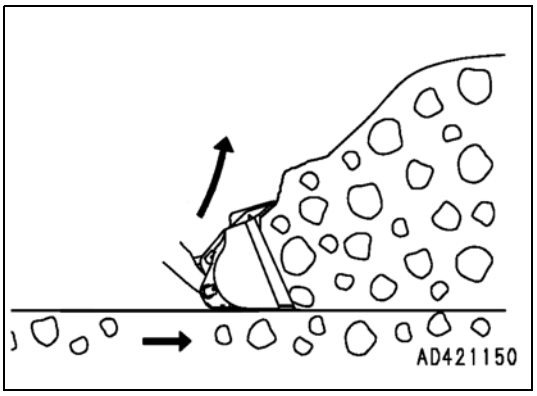
4. **When Loading Blasted Rock:**
   Angle the cutting edge of the bucket forward slightly. Using the inching brake pedal in combination with the accelerator pedal, increase the RPM while slowly releasing the left brake pedal as you proceed into the pile slowly with the bucket tipped forward.



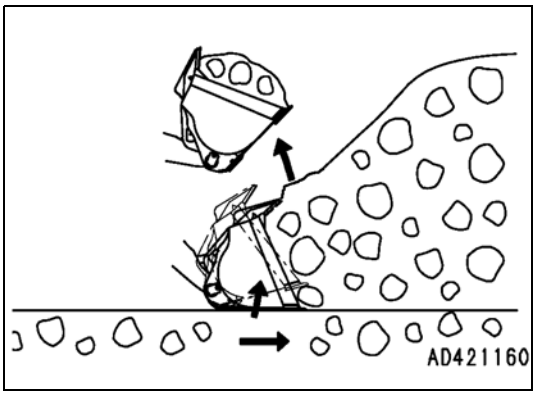
5. Once the bucket is into the pile raise the bucket slightly to put weight on the front tires and roll the bucket back, while continuing to enter the pile.

Remark

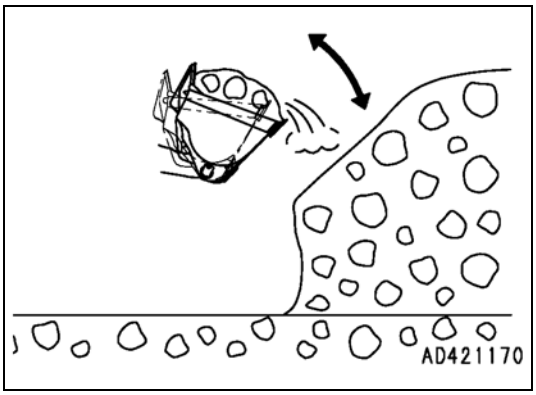
Rasing the bucket slightly while into the pile will help reduce wheel spin by putting more weight on the front axle.



6. When full, roll the bucket back to its furthest point and raise the loaded bucket enough to clear the pile as you back out of the pile.



7. If there is too much material in the bucket, tip the bucket forward slightly to dump excess material then tilt it back when the load is ready to transport.

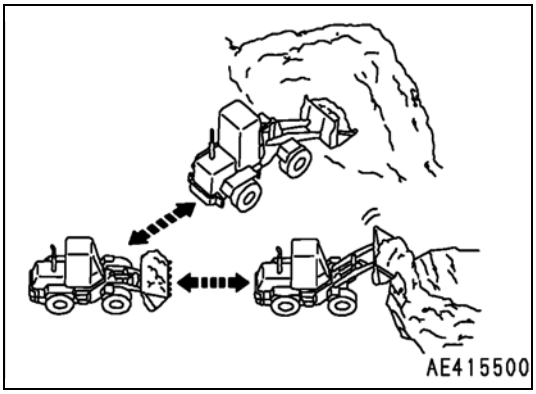


Remark

Be careful not to get blasted rock under the bucket. This will cause the front tires come off the ground and slip. Try to keep the load in the center of the bucket; if the load is on one side of the bucket, the load will be unbalanced.

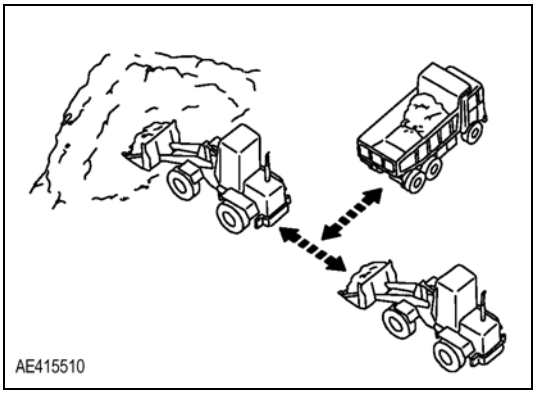
LOAD AND CARRY OPERATIONS

- When carrying a load, keep the bucket as low as possible to lower the center of gravity when traveling.
- When the machine is traveling or the work equipment is raised, and the E.C.S.S. switch is turned **ON**, the work equipment will move.
- If operations are carried out with the E.C.S.S. switch in the **ON** position, and the travel damper is actuated, the work equipment will also move.
- The load and carry method for wheel loaders consists of the cycle of scooping - hauling -loading (into a hopper, truck, etc.) Always keep the travel path properly maintained.



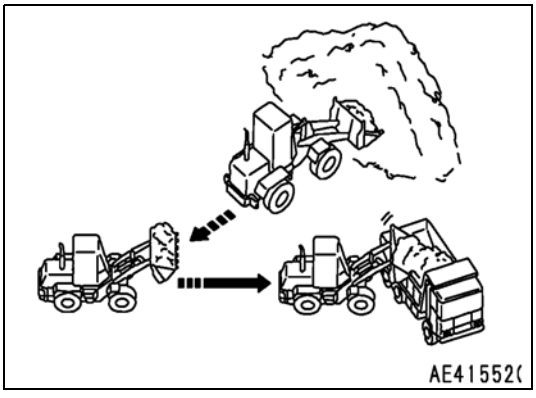
LOADING TRUCKS OR HOPPERS

- Select the method of operation which will give you the minimum amount of turning and travel in order to provide the most efficient method for the job site.
- Always set the wheel loader facing at a right angle to the stock pile. After scooping up the load, drive the machine straight back in reverse, then bring the dump truck in between the stock pile and the wheel loader.
- This method requires the least time for loading, and is extremely effective in reducing the cycle time.



V-SHAPED LOADING TECHNIQUE

- Position the dump truck so that the direction of approach of the wheel loader is approx. 60 degrees from the direction of approach to the stockpile.
- After loading the bucket, drive the wheel loader in reverse, then turn it to face the dump truck and travel forward to load the dump truck. The smaller the turning angle of the wheel loader is, the more efficient the operation becomes.
- When loading with a full bucket and raising it to the maximum height, first shake the bucket to stabilize the load before raising the bucket. This will prevent the load from spilling to the rear onto the machine.



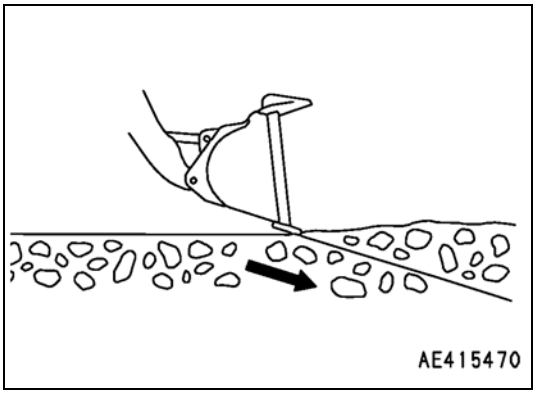
CUTTING OR DIGGING

When digging or cutting a grade on level ground, set the bucket edge facing down slightly. Always be careful not to load the bucket on one side and cause an unbalanced load situation. This operation should be carried out in 1st gear.

WARNING

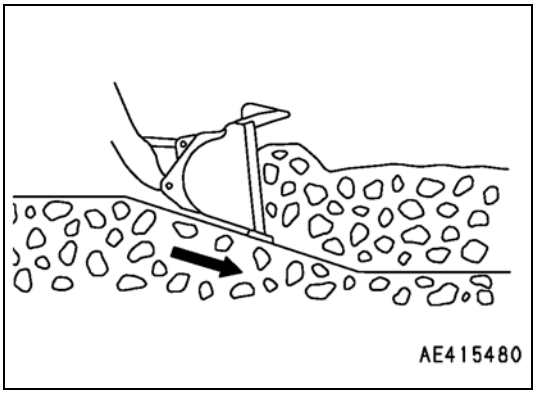
Do not angle the bucket facing down more than 20 degrees.

1. Angle the edge of the bucket facing slightly down.

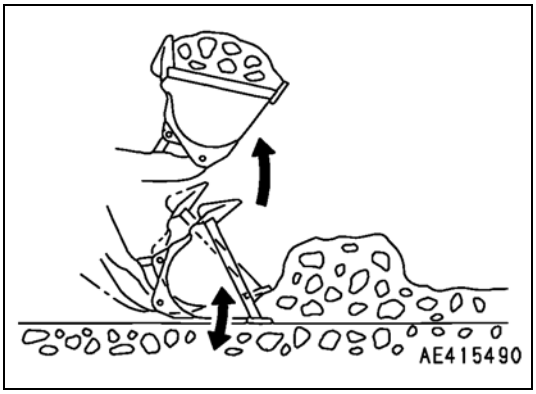


2. Using the left brake pedal and accelerator pedal drive the machine forward and operate the work equipment control lever to cut a thin layer of the surface each time when excavating the soil.

3. Move the work equipment up and down slightly as needed to reduce the resistance when driving the machine forward.



4. When cutting a grade avoid racking the bucket to one side. Damage to the machine may result.



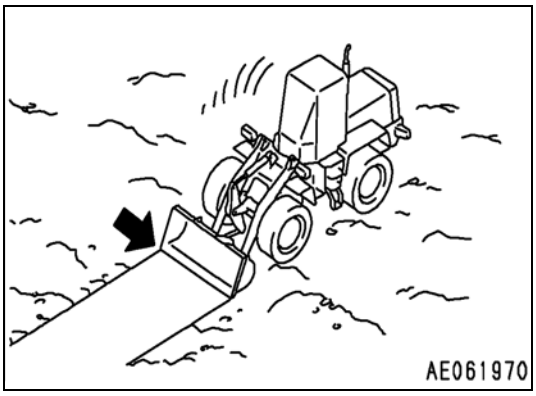
GRADING OR LEVELING A SURFACE

- Always operate the machine in reverse when carrying out leveling operations.
- Although not advised, if it is necessary to carry out leveling operations when traveling forward, do not angle the bucket down more than 20 degrees.
- Turn the E.C.S.S. switch (if equipped) **OFF** when carrying out leveling operations.

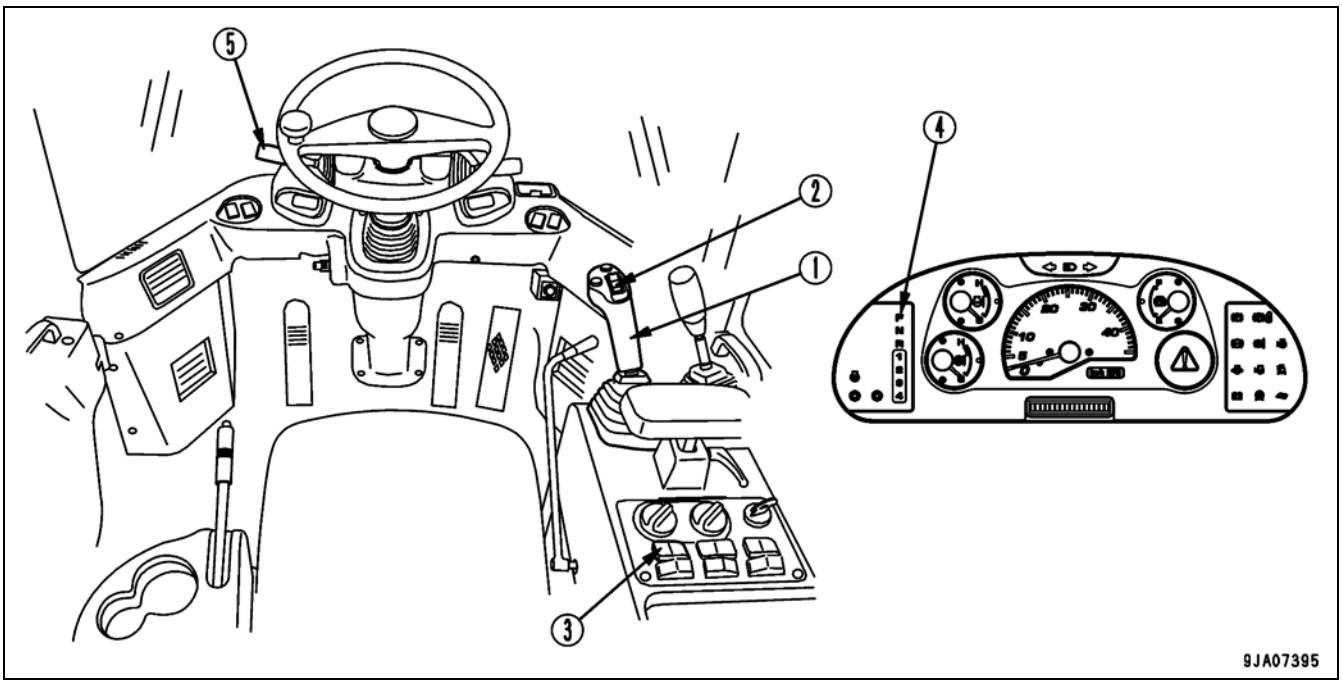
1. With a full bucket of material. Move the machine backward slowly while spreading soil from the bucket little by little.

2. With the machine in the **FLOAT** position go over the spread soil in reverse with the bucket on the ground and tipped down slightly to level the ground by back-dragging.

3. Load some more soil into the bucket, put the lift arm control lever in **FLOAT** position, level the bucket at ground level, and smooth the ground by moving backward.

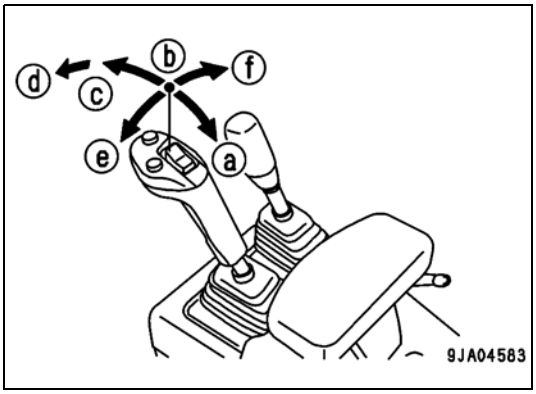


USING MULTI-FUNCTION LEVER



1. Work equipment lever	2. Directional selector switch
3. Directional selector switch actuation switch	4. Directional selector pilot lamp

EXPLANATION OF OPERATION



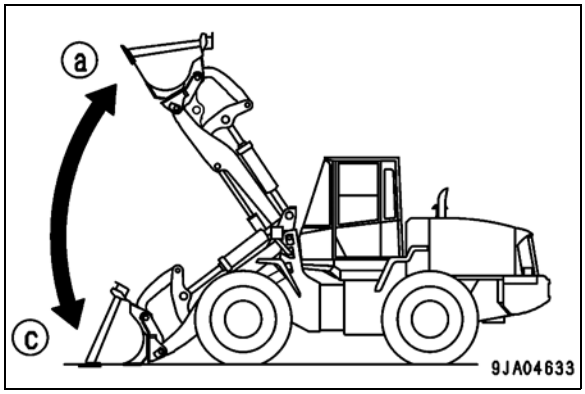
WORK EQUIPMENT LEVER

Use this lever (1) to operate the lift arm and bucket.

WARNING

Do not use the FLOAT feature when using the forks kit. Possible injury or damage to machine or load may result

1. Position (a): **RAISE**
   - When the work equipment control lever is pulled further beyond the **RAISE** position, the lever is stopped in this position until the lift arm reaches the preset position of the kick out, and the lever is returned to the **HOLD** position.
2. Position (b): **HOLD**
   - The lift arm and bucket stop and remain in the same position.
3. Position (c): **LOWER**
4. Position (d): **FLOAT**

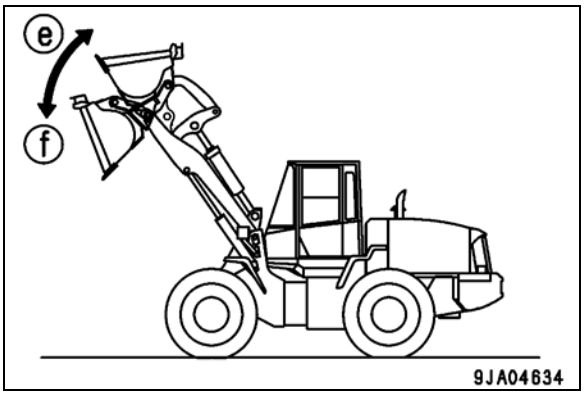


- The lift arm moves freely under external force.

5. Position (e): **TILT**

   - When the work equipment control lever is pulled further beyond the **TILT** position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the **HOLD** position.

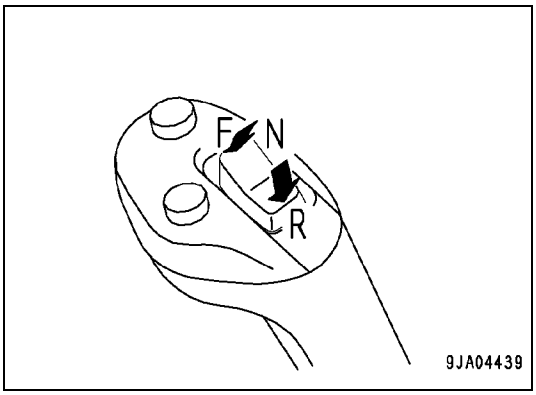
6. Position (f): **DUMP**



DIRECTIONAL SELECTOR SWITCH

This switch (2) is used to switch the direction of travel of the machine between forward and reverse.

F Position: **FORWARD**
N Position: **NEUTRAL**
R Position: **REVERSE**



Before operating this switch, check that the condition is as follows.

- Directional lever is at **N**
- Directional selector switch actuation switch is at **ON**

If the condition is not as above, the switch will not work.

Remark

When directional selector switch operation switch (3) is ON, if directional lever (5) is not at the N position and directional selector switch (2) is also not at the N position, the engine will not start.

DIRECTIONAL SELECTOR ACTUATION SWITCH

When this switch (3) is turned on, the directional selector switch is actuated.

- Position (a): **ON**

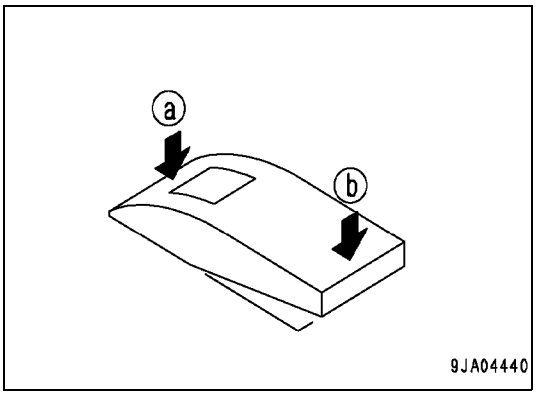
The directional selector switch is actuated.

- Position (b): **OFF**

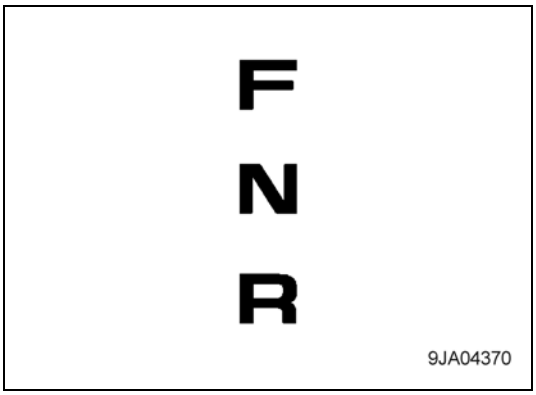
The directional selector switch is turned off.

Remark

Turn this switch ON when the directional lever and directional selector switch are at the neutral position. At any other position, this switch does not work. Even if the directional selector switch is functioning, when the directional lever is operated, the operation of the directional lever is given priority.



DIRECTIONAL SELECTOR LAMP



This lamp (4) displays the position of the directional selector switch under the following conditions.

- Directional selector switch operation switch: **ON** position
- Directional lever: **N** position
    - **F** lights up: **FORWARD**
    - **N** lights up: **NEUTRAL**
    - **R** lights up: **REVERSE**
- Directional lever: Neutral position
- Directional selector actuation switch (3): **ON** position

Directional selector switch (2): Forward or Reverse position

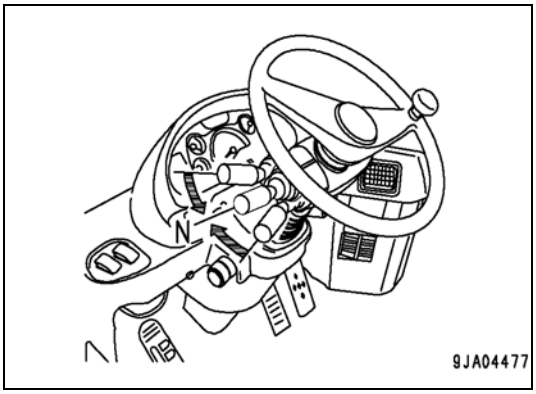
When the starting switch is turned to the **ON** position with the levers and switches in the following condition, all directional lever positional pilot lamps (4) will go out. If directional selector switch (2) is then set to the **N** position, directional lever positional pilot lamps (4) display the normal condition “N“.

USING SWITCH TO CHANGE BETWEEN FORWARD AND REVERSE

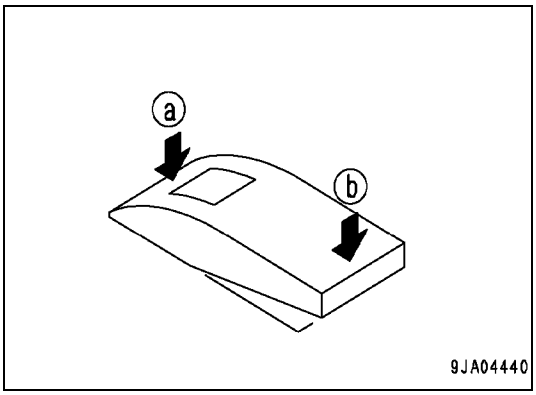
⚠ WARNING

- **When changing direction between FORWARD and REVERSE, check that the new direction of travel is safe. There is a blind spot behind the machine, so be particularly careful when changing direction to travel in reverse.**
- **Do not switch between FORWARD and REVERSE when traveling at high speed. When switching between FORWARD and REVERSE, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max.speed for changing direction: 13 km/h (8.1 MPH))**
- **When the directional selector switch actuation switch (3) is at the ON position, if the directional lever (1) is operated to FORWARD or REVERSE, the machine will travel in forward or reverse according to the operation of the directional lever, regardless of the position of the directional selector switch (2). Priority is given to the operation of the directional lever, so be careful when operating.**

1. Place the directional lever (1) at the **N** position.
2. Place the directional selector switch (2) at the **N** position.



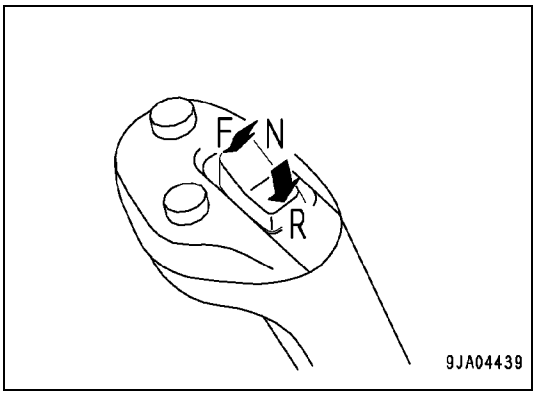
3. Place the directional selector switch actuation switch (3) at the **ON** position (a).



4. Place the directional selector switch (2) at the **F** (forward) or **R** (reverse) position.

When the directional selector switch actuation switch (3) is at the **ON** position, if the directional lever (1) is operated to **FORWARD** or **REVERSE**, the machine will travel in forward or reverse according to the operation of the directional lever, regardless of the position of the directional selector switch (2). Priority is given to the operation of the directional lever.

When using directional selector switch (2) again, set directional lever (1) and directional selector switch (2) to the **N** position.



OPTIONAL WORK EQUIPMENT

COUPLER SYSTEM

The versatile, factory-supplied coupler system provides fast, efficient tool changes without leaving the cab. Your Komatsu tool carrier allows interchangeability between models as well as several major manufacturers. This design also allows superior visibility of the work equipment.

ATTACHMENTS

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