GALEO

D61EX,PX-15

Operation & Maintenance Manual

KEAM049700T

GALEO

D61EX-15

D61PX-15

BULLDOZER

SERIAL NUMBERS B40001 and up

KOMATSU

⚠ WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

NOTICE

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

KOMATSU

FOREWORD

CALIFORNIA

Proposition 65 Warning

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

CALIFORNIA

Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Wash hands after handling.

FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. The precautions in this manual must be followed at all times when performing operation and maintenance. Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. Accidents can be prevented by knowing beforehand conditions that may cause a hazard when performing operation and maintenance.

⚠ WARNING

Before beginning operation or maintenance, operators and maintenance personnel must always observe the following points.

Read this manual thoroughly and understand its contents fully.

Read the safety messages and safety labels given in this manual carefully so that they should be understood fully.

Keep this manual at the storage location for the Operation and Maintenance Manual given below so that all personnel involved in working on the machine can consult it periodically.

In case this manual should be lost or damaged, immediately contact Komatsu or your Komatsu distributor to obtain a new copy.

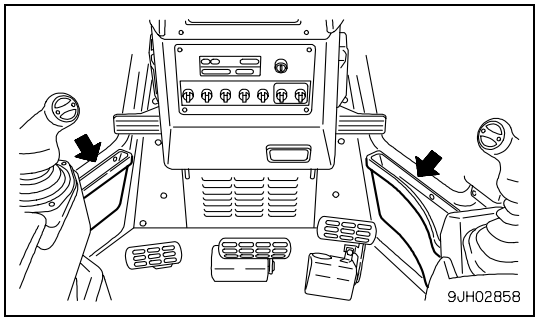
When you sell the machine, make sure that this manual should be provided to the new owner together with the machine.

In this manual, measurements are expressed in international standard units (SI). For the reference purpose, weight units used in the past are also displayed in { }.

Storage location for the Operation and Maintenance Manual:

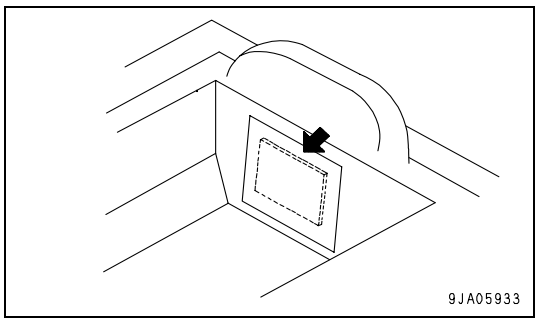
If machine is equipped with a cab.

Inside of right and left doors



If machine is not equipped with cab.

Rear face of floor



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 PARTICUALR 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.

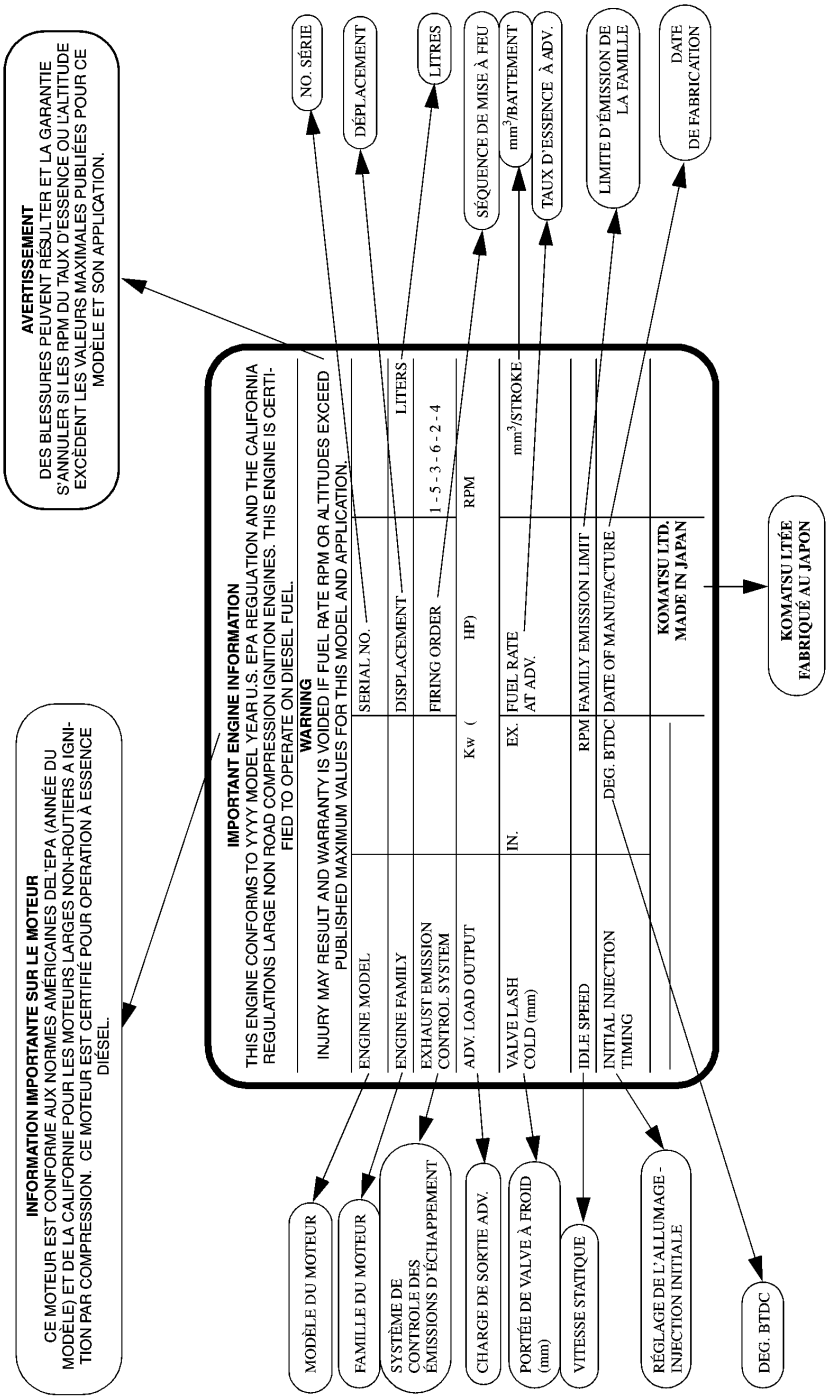
3. Limitations:

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.**

CEKQ000600 - Komatsu America International Company 12/99



ENGINE DATAPLATE - ENGLISH / FRENCH

SAFETY INFORMATION

To enable you to use this machine safely, safety precautions and labels are given in this manual and affixed to the machine to give explanations of situations involving potential hazards and of the methods of avoiding such situations.

Signal words

The following signal words are used to inform you that there is a potential hazardous situation that may lead to personal injury or damage.

In this manual and on machine labels, the following signal words are used to express the potential level of hazard.

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This word is used also to alert against unsafe practices that may cause property damage.

Example of safety message using signal word

⚠ WARNING

When standing up from the operator's seat, always place the work equipment lock lever in the LOCK position.
If you accidentally touch the control levers when they are not locked, this may cause a serious injury or death.

Other signal words

In addition to the above, the following signal words are used to indicate precautions that should be followed to protect the machine or to give information that is useful to know.

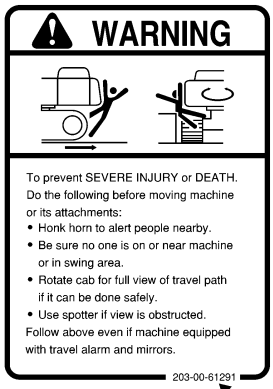
NOTICE	This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.
REMARKS	This word is used for information that is useful to know.

- **Safety labels**

Safety labels are affixed to the machine to inform the operator or maintenance worker on the spot when carrying out operation or maintenance of the machine that may involve hazard.

This machine uses “Safety labels using words“ and “Safety labels using pictograms“ to indicate safety procedures.

Example of safety label using words



Safety labels using pictogram

Safety pictograms use a picture to express a level of hazardous condition equivalent to the signal word. These safety pictograms use pictures in order to let the operator or maintenance worker understand the level and type of hazardous condition at all times. Safety pictograms show the type of hazardous condition at the top or left side, and the method of avoiding the hazardous condition at the bottom or right side. In addition, the type of hazardous condition is displayed inside a triangle and the method of avoiding the hazardous condition is shown inside a circle.

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages 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, it is your responsibility to take the necessary steps to ensure safety.

In no event should you engage in prohibited uses or actions described in this manual.

The explanations, values, and illustrations in this manual were prepared based on the latest information available at that time. Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

The numbers in circles in the illustrations correspond to the numbers in ( ) in the text. (For example: ① -> (1))

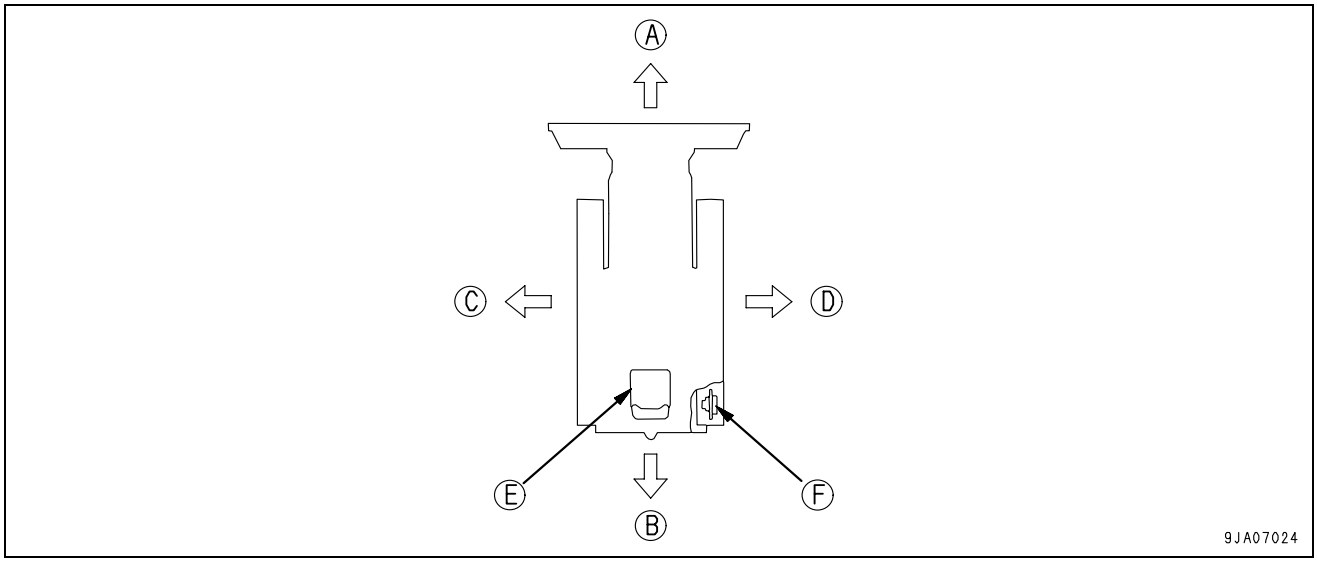
INTRODUCTION

This Komatsu machine is designed to be used mainly for the following work:

- Dozing
- Smoothing
- Cutting into hard or frozen ground or ditching
- Felling trees, removing stumps

See the section “WORK POSSIBLE USING BULLDOZER (3-110)“ for further details.

FRONT/REAR, LEFT/RIGHT DIRECTIONS OF MACHINE



(A) Front
(B) Rear
(C) Left
(D) Right
(E) Operator's seat
(F) Sprocket

In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's seat when the operator's seat is facing the front and the sprocket is at the rear of the machine.

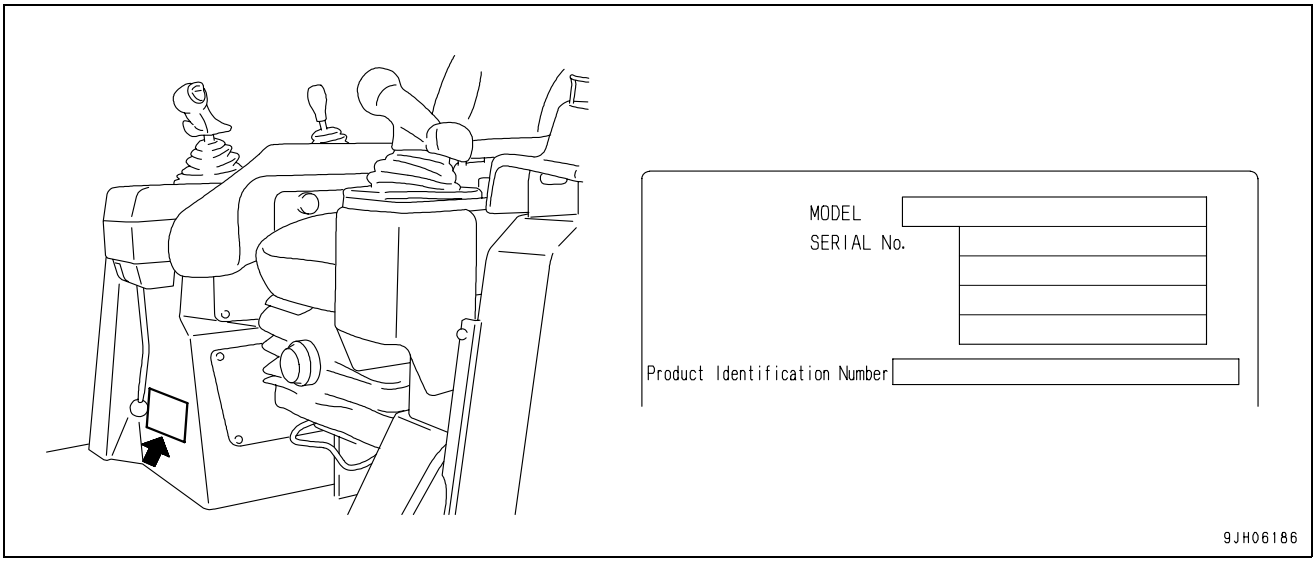
NECESSARY INFORMATION

When requesting service or ordering replacement parts, please inform your Komatsu distributor of the following items.

PRODUCT IDENTIFICATION NUMBER (PIN)/MACHINE SERIAL NO. PLATE

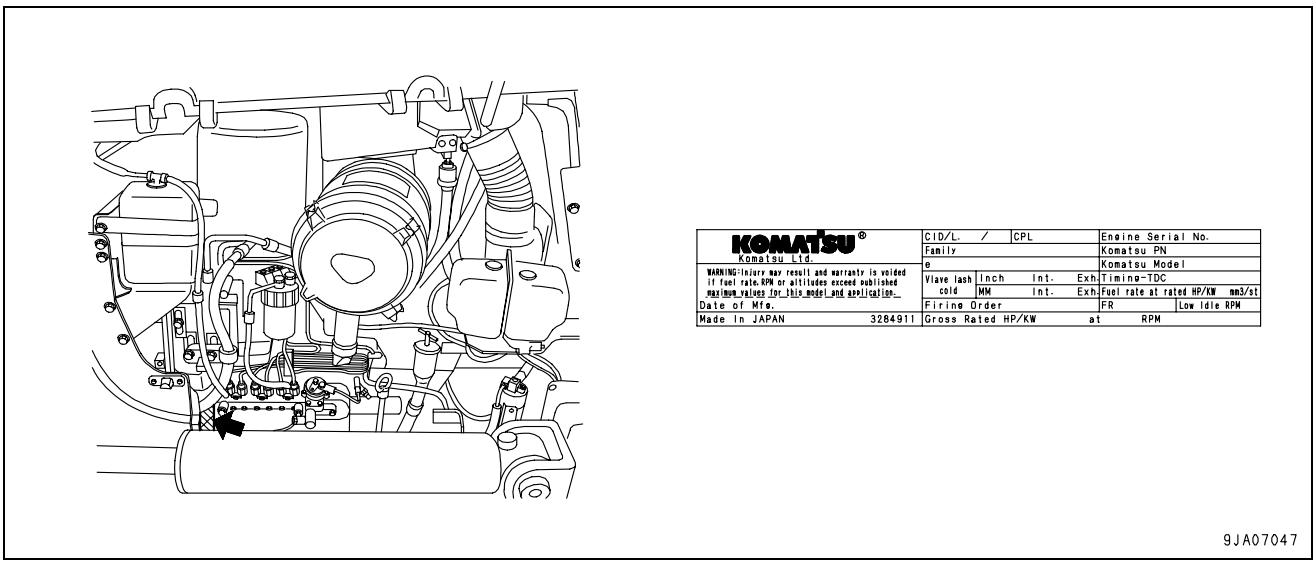
This is at the front bottom right of the operator's seat.

The design of the nameplate differs according to the territory.



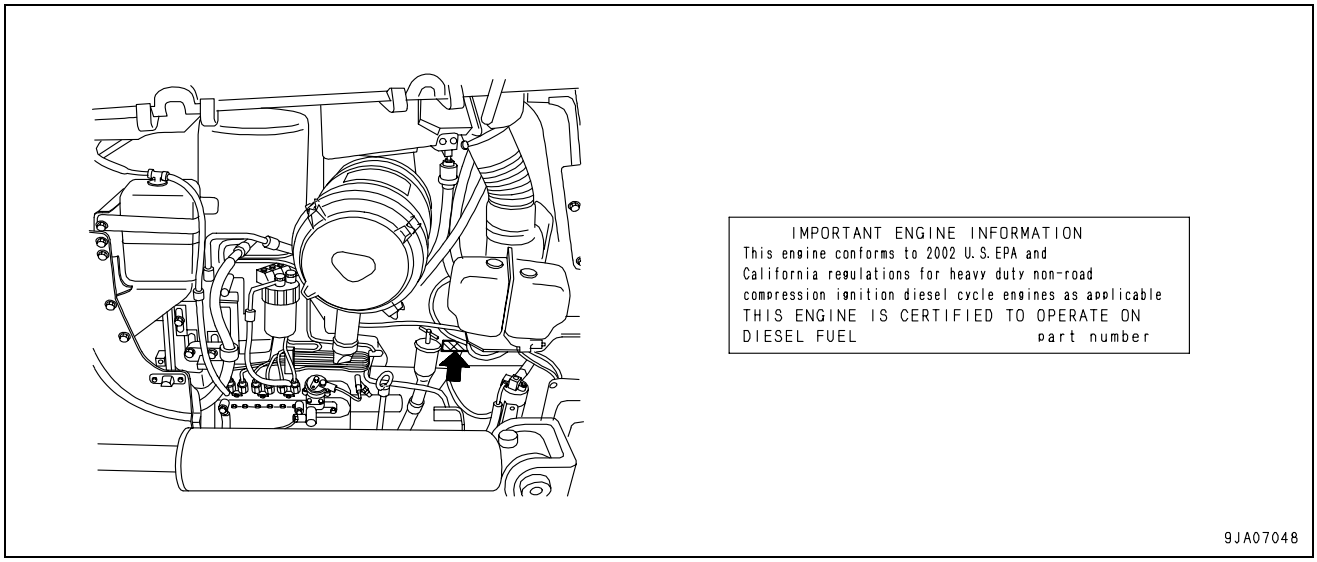
ENGINE SERIAL NO. PLATE

This is at the front top of the engine on the left side machine.



EMISSION CONTROL INFORMATION LABEL

This is at the top on the side face of the engine on the left side of the machine.



POSITION OF SERVICE METER

The service meter is provided at the lower part of the monitor panel.

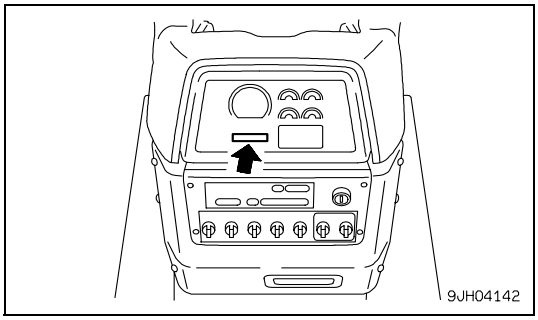


TABLE OF ENTER SERIAL NO. AND DISTRIBUTOR

Machine serial No.	
Engine serial No.	
Product identification number (PIN)	
Distributor name	
Address	
Service Personnel	
Phone/Fax	

CONTENTS

FOREWORD

SAFETY

OPERATION

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SPECIFICATIONS

ATTACHMENTS, OPTIONS

SAFETY

⚠ WARNING

Please read and make sure that you fully understand the precautions described in this manual and the safety labels on the machine. When operating or servicing the machine, always follow these precautions strictly.

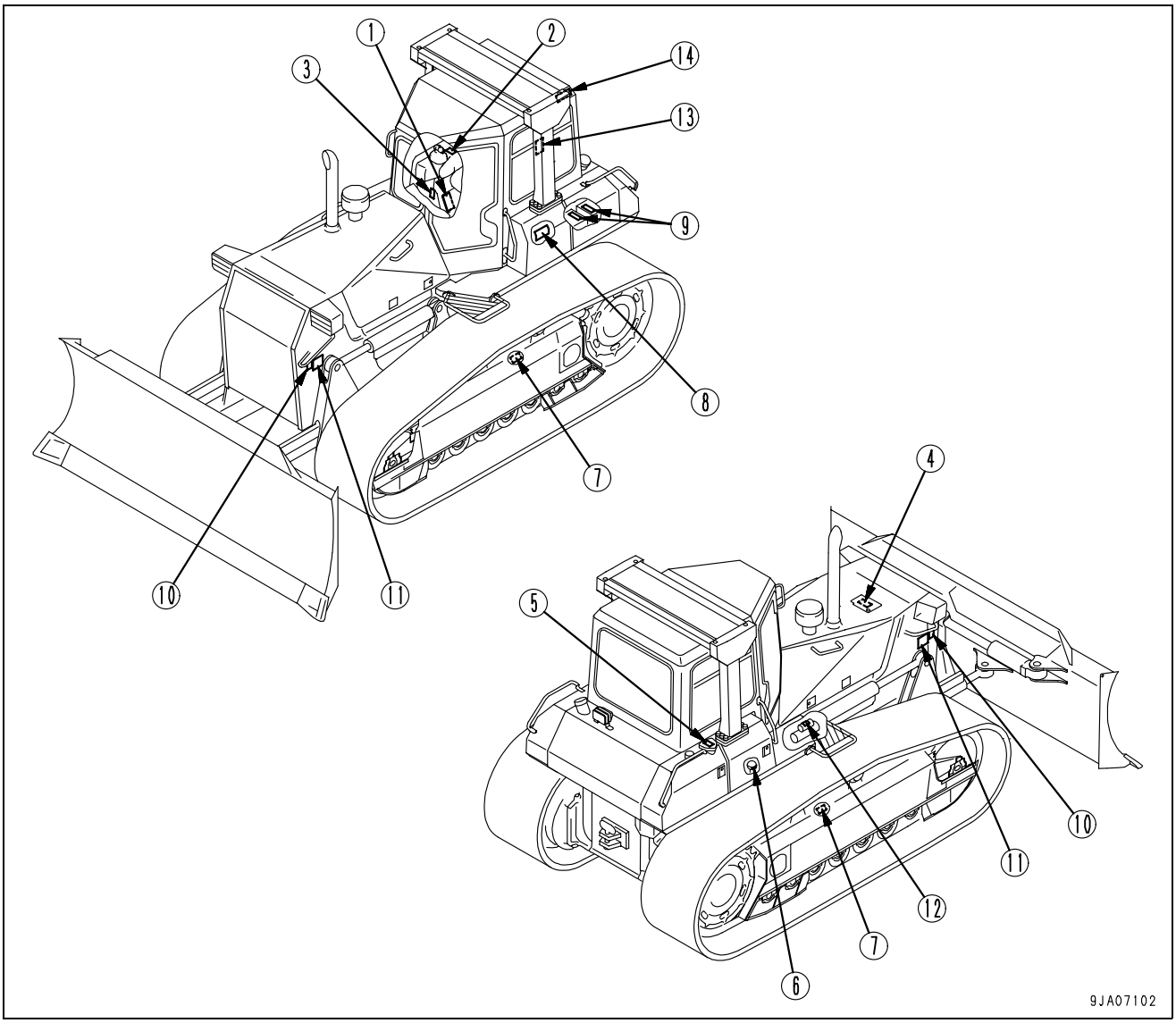
SAFETY

SAFETY LABELS

The following warning signs and safety labels are used on this machine.

- Be sure that you fully understand the correct position and content of labels.
- To ensure that the content of labels can be read properly, be sure that they are in the correct place and always keep them clean. When cleaning them, do not use organic solvents or gasoline. These may cause the labels to peel off.
- There are also other labels in addition to the warning signs and safety labels. Handle those labels in the same way.
- If the labels are damaged, lost, or cannot be read properly, replace them with new ones. For details of the part numbers for the labels, see this manual or the actual label, and place an order with Komatsu distributor.

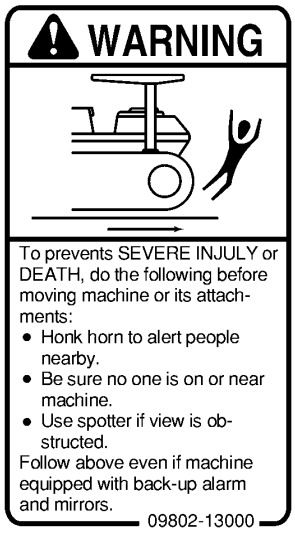
POSITIONS OF SAFETY PICTOGRAMS



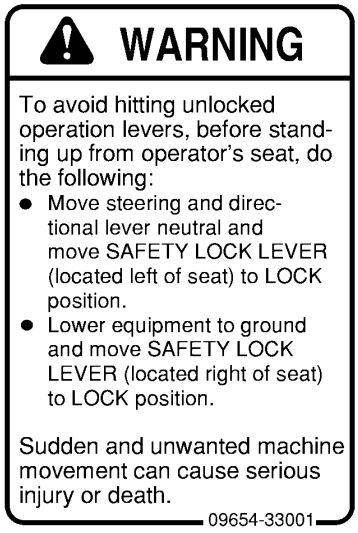
SAFETY LABELS

(1) Caution before operating or maintaining machine (09651-03001)

(2) Caution before moving in reverse (09802-13000)



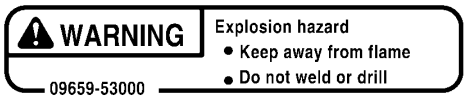
(3) Caution for leaving operator's seat (09654-33001)



(4) Caution for high-temperature cooling water (09668-03001)

(5) Caution for high-temperature oil (09653-03001)

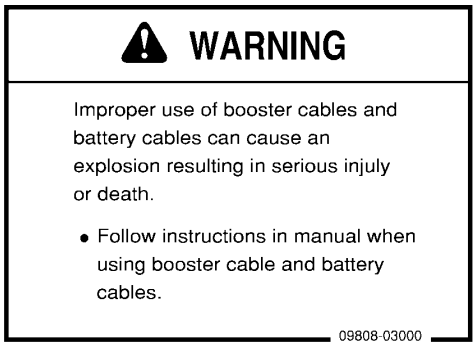
(6) Caution for accumulator (09659-53000)



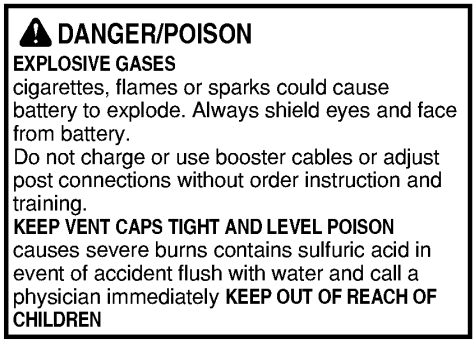
(7) Caution for adjusting track tension (09657-03003)

The safety label is attached to the rear side of the track adjustment window cover.

(8) Caution for battery cable (09808-03000)



(9) Precautions when handling battery



(This plate is stick on the machine by the battery maker.)

(10) Caution for engine running (09667-03001)

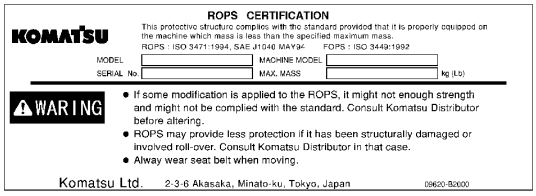
(11) Caution for approach when machine moving (09812-13000)

(12) Prohibition of jump start (09842-A0481)

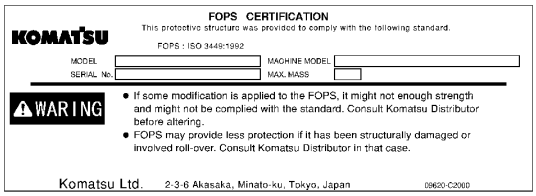
Start the engine only after sitting down in the operator's seat.

Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.

(13) Caution for ROPS (09620-B2000)



(14) Caution for FOPS (09620-C2000)



GENERAL PRECAUTIONS

SAFETY RULES

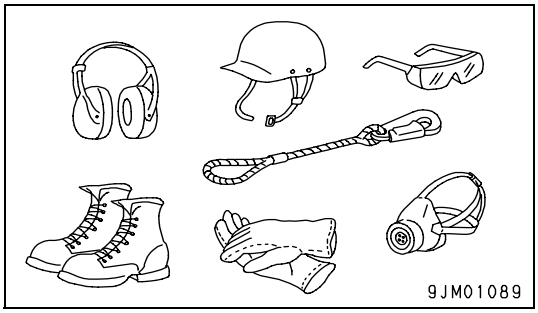
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severly impaired putting yourself and everyone else on your jobsite in danger.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.

IF PROBLEMS ARE FOUND

If you find any problems in the machine during operation or maintenance (noise, vibration, smell, incorrect gauges, smoke, oil leakage, etc., or any abnormal display on the warning devices or monitor), report to the person in charge and have the necessary action taken. Do not operate the machine until the problem has been corrected.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

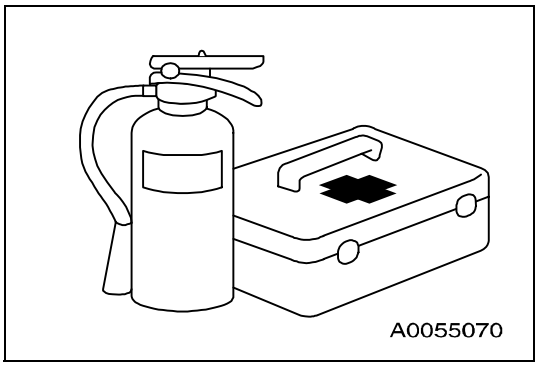
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get caught.
- Always wear a hard hat and safety shoes. If the nature of the work requires it, wear safety glasses, mask, gloves, ear plugs, and safety belt when operating or maintaining the machine.
- Check that all protective equipment functions properly before using it.



FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them in emergencies.
- Carry out periodic inspection and maintenance to ensure that the fire extinguisher can always be used.
- Provide a first aid kit at the storage point. Carry out periodic checks and add to the contents if necessary.

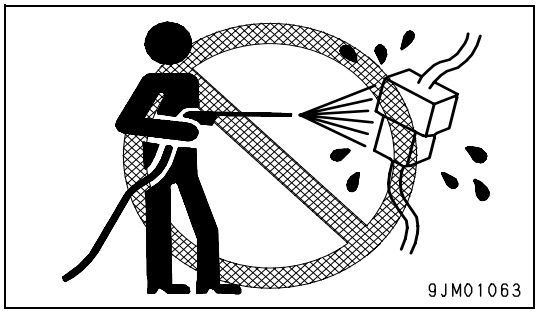


SAFETY FEATURES

- Be sure that all guards and covers are in their proper position. Have guards and covers repaired immediately if they are damaged.
- Understand the method of use of safety features and use them properly.
- Never remove any safety features. Always keep them in good operating condition.

KEEP MACHINE CLEAN

- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. Do not use water or steam to wash the electrical system (sensors, connectors).
- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard that you will slip and fall, or that dirt or mud will get into your eyes. Always keep the machine clean.



INSIDE OPERATOR'S COMPARTMENT

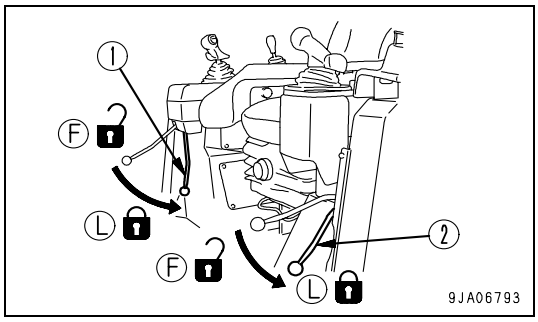
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes.

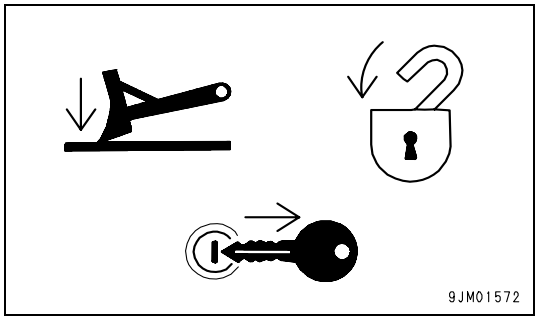
  If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Do not use 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 compartment.

ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

- Before standing up from the operator's seat (such as when adjusting the operator's seat), lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) securely to the LOCK position (L), then stop the engine.

  If you accidentally touch the levers when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.
- When leaving the machine, always lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) securely to the LOCK position (L), then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.



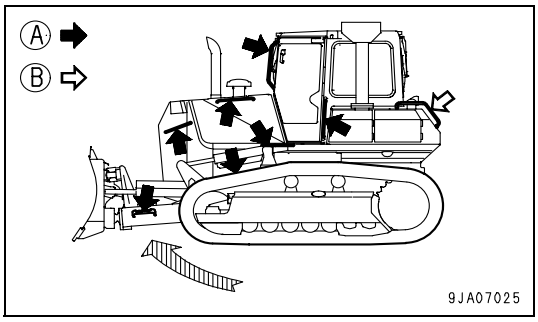


HANDRAILS AND STEPS

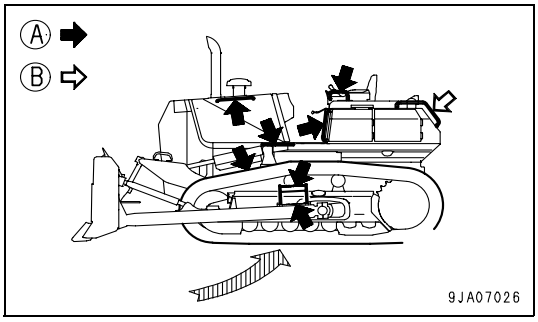
To prevent personal injury caused by slipping or falling off the machine, always do as follows.

- Use the handrails and steps marked by arrows (A) in the diagram when getting on or off the machine.
- The handrail marked by arrow (B) in the diagram is provided to support yourself when refilling the fuel tank with the fuel. Do not use it for getting on or off the machine.

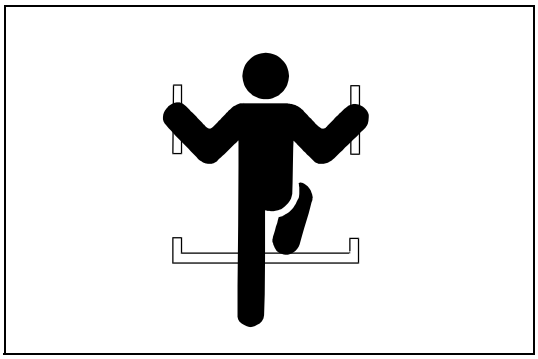
For power angle, power tiltdozer



For power tiltdozer



- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps (including the track shoe) to ensure that you support yourself.
- Do not grip the control levers, work equipment lock lever, or parking brake lever when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Do not get on or off the machine while holding tools in your hand.



MOUNTING AND DISMOUNTING

- Never jump on or off the machine. Never get on or off a moving machine.
- If the machine starts to move when there is no operator on the machine, do not jump on to the machine and try to stop it.

NO PEOPLE ON ATTACHMENTS

Never let anyone ride on the work equipment, or other attachments. There is a hazard of falling and suffering serious injury.

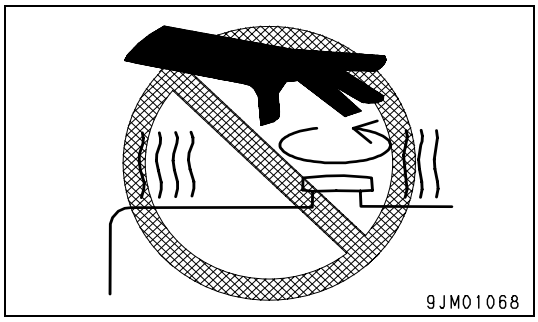
CRUSHING OR CUTTING PREVENTION

The clearance around the work equipment will change according to the movement of the link. If you get caught, this may lead to serious personal injury. Do not allow anyone to approach any rotating or telescoping part.

PREVENTION OF BURNS

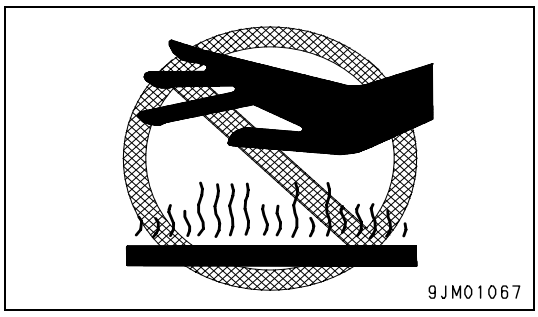
Hot coolant

- To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure inside the radiator before removing the cap.



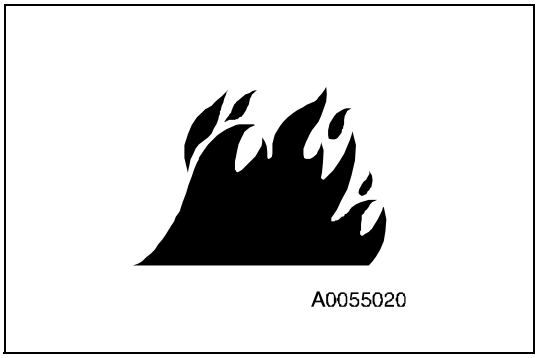
Hot oil

- To prevent burns from hot oil spurting out when checking or draining the oil, wait for the oil to cool to at temperature where it is possible to touch the cap or plug by hand before starting the operation. Even when the oil has cooled down, loosen the cap or plug slowly to relieve the internal pressure before removing the cap or plug.



FIRE PREVENTION

- **Fire caused by fuel or oil**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Fuel, oil, antifreeze, and window washer liquid are particularly flammable and can be hazardous. To prevent fire, always observe the following:

- Do not smoke or use any flame near fuel or oil.
- Stop the engine before refueling.
- Do not leave the machine while adding fuel or oil.
- Tighten all fuel and oil caps securely.
- Do not spill fuel on overheated surfaces or on parts of the electrical system.
- Use well-ventilated areas for adding or storing oil and fuel.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- When carrying out grinding or welding work on the chassis, move any flammable materials to a safe place before starting.
- When washing parts with oil, use a non-flammable oil. Diesel oil and gasoline may catch fire, so do not use them.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the work place.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.

- **Fire caused by accumulation of flammable material.**

  Remove any dry leaves, chips, pieces of paper, dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the undercovers.

- **Fire coming from electric wiring**

  Short circuits in the electrical system can cause fire.

  - Always keep electric wiring connections clean and securely tightened.
  - Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.

- **Fire coming from hydraulic line**

  Check that all the hose and tube clamps, guards, and cushions are securely fixed in position.

  If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.

- Explosion caused by lighting equipment
  - When checking fuel, oil, battery electrolyte, window washer fluid, or coolant, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion that may cause serious injury.
  - When taking the electrical power for the lighting from the machine itself, follow the instructions in this manual.

ACTION IF FIRE OCCURS

If a fire occurs, escape from the machine as follows.

- Turn the start switch OFF to stop the engine.
- Use the handrails and steps to get off the machine.

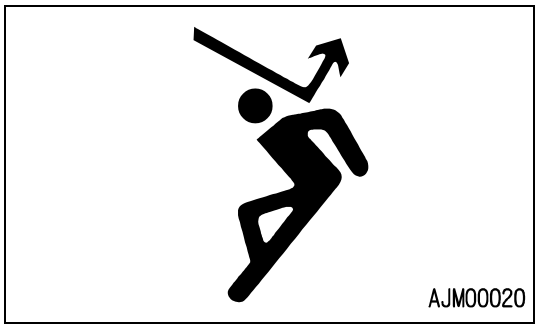
WINDOW WASHER LIQUID

Use an ethyl alcohol base washer liquid.

Methyl alcohol base washer liquid may irritate your eyes, so do not use it.

PRECAUTIONS WHEN USING ROPS

Install ROPS when working in places where there is danger of falling rocks, such as in mines and quarries, or in places where there is danger of rolling over.



- If ROPS is installed, do not remove it when operating the machine.
- ROPS is installed to protect the operator when machine rolls over. When machine rolls over, ROPS supports its weight and absorbs its impact energy.
- If ROPS is modified, its strength may be reduced. When modifying, consult your Komatsu distributor.
- If ROPS is damaged or deformed by falling objects or by rolling over, its strength will be reduced and it will not be able to fulfill its function properly. In such cases, always Komatsu contact your distributor for advice of the method of repair.

  Even if ROPS is installed, always fasten your seat belt properly when operating the machine. If you do not use your fasten your seat belt properly, it cannot display its effect.

PRECAUTIONS FOR ATTACHMENTS

- When installing optional parts or attachments, there may be problems with safety or legal restrictions. Therefore contact your Komatsu distributor for advice.
- Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.

UNAUTHORIZED MODIFICATION

Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

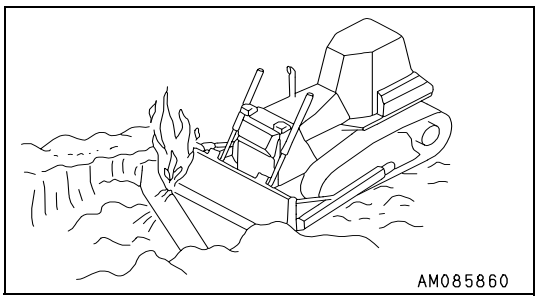
- Komatsu will not be responsible for any injuries, accidents, product failures or other property damages resulting from modifications made without authorization from Komatsu.

SAFETY AT WORKSITE

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take action to prevent unauthorized people from approaching the jobsite.

  When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.
- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.



WORKING ON LOOSE GROUND

- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

Do not travel or operate the machine near electric cables. There is a hazard of electric shock, which may cause serious injury or property damage. On jobsites where the machine may go close to electric cables, always do as follows.

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.
- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.

Voltage of Cables	Safety Distance
100 V - 200 V	Over 2 m (7 ft)
6,600 V	Over 2 m (7 ft)
22,000 V	Over 3 m (10 ft)
66,000 V	Over 4 m (14 ft)
154,000 V	Over 5 m (17 ft)
187,000 V	Over 6 m (20 ft)
275,000 V	Over 7 m (23 ft)
500,000 V	Over 11 m (36 ft)

- If the machine should come too close or touch the electric cable, to prevent electric shock, the operator should not leave the operator's compartment until it has been confirmed that the electricity has been shut off.

  Also, do not let anyone come close to the machine.

ENSURE GOOD VISIBILITY

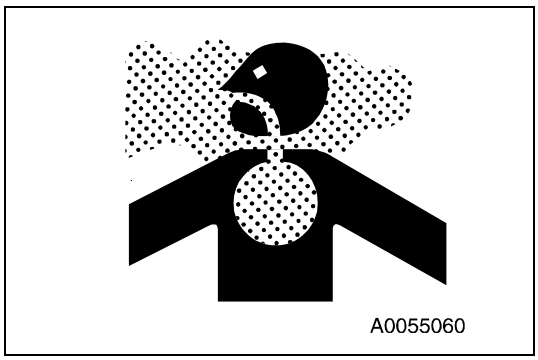
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- Position a signalman if there are areas at the rear of the machine where the visibility is not good.
- When working in dark places, turn on the working lamp and front lamps installed to the machine, and set up additional lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, rain, or dust.

VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, or when handling fuel, flushing oil, or paint, open the doors and windows to ensure that adequate ventilation is provided to prevent gas poisoning.



CHECKING SIGNALMAN'S SIGNALS AND SIGNS

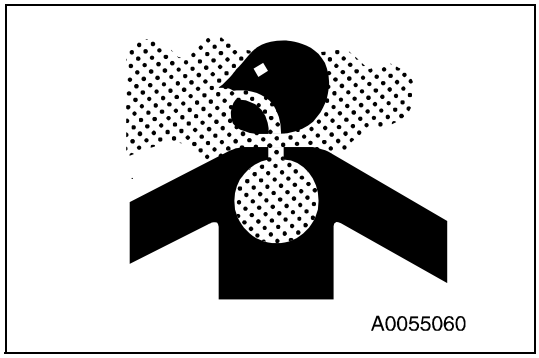
- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand the meaning of all signals and signs before starting work.

EMERGENCY EXIT FROM OPERATOR'S CAB

Machines equipped with a cab have doors on the left and right sides. If the door on the one side does not open, escape from the door on the other side.

BE CAREFUL ABOUT ASBESTOS DUST

Asbestos dust in the air can cause lung cancer if it is inhaled. There is danger of inhaling asbestos when working on jobsites handling demolition work or work handling industrial waste. Always observe the following.



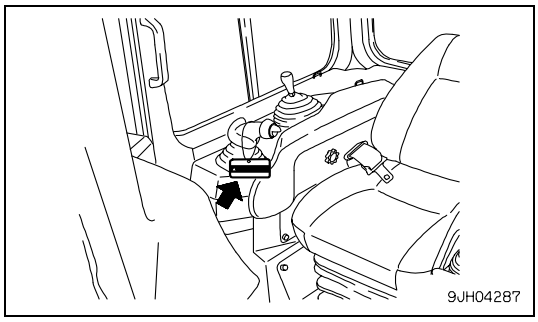
- Spray water to keep down the dust when cleaning. Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position. All workers should use an approved respirator.
- Do not allow other persons to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.

PRECAUTIONS FOR OPERATION

STARTING ENGINE

If there is a warning tag hanging from the work equipment control lever, do not start the engine or touch the levers .



CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the day's work.

- Remove all dirt from the surface of the window glass to ensure a good view.
- Remove all dirt from the surface of the lens of the front lamps and working lamps, and check that they light up correctly.
- Check the coolant level, fuel level, and oil level in engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
- Check that the gauges work properly, check the angle of the lights and working lamps, and check that the control levers are all at the neutral position.
- Adjust the mirror to a position which gives a good view to the rear from the operator's seat.
- Check that there are no persons or obstacles above, below, or in the area around the machine.

PRECAUTIONS WHEN STARTING

- Start and operate the machine only while seated.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- When starting the engine, sound the horn as a warning.
- Do not allow anyone apart from the operator to ride on the machine.

PRECAUTIONS IN COLD AREAS

- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- 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 and cause the battery to explode.

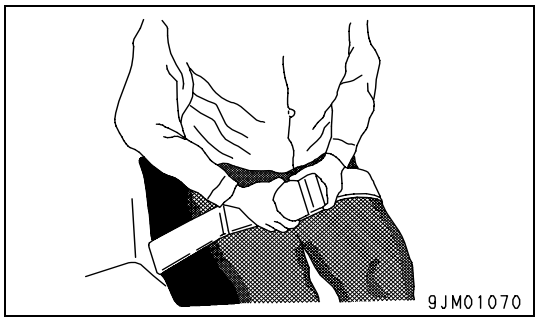
  Before charging or starting the engine with a different power source, melt the battery electrolyte and check that there is no leakage of electrolyte before starting.

OPERATION

CHECKS BEFORE OPERATION

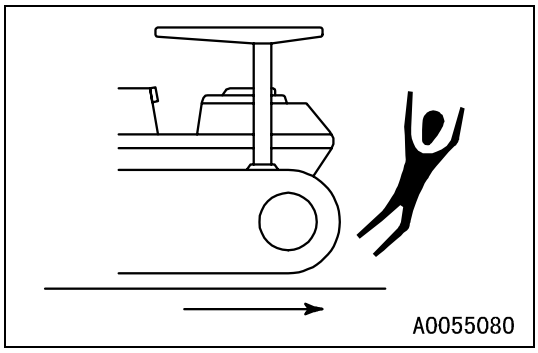
When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

- Always fasten your seat belt.
- Check the operation of travel, steering and brake systems, and work equipment control system.
- Check for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any abnormality is found, carry out repairs immediately.



PRECAUTIONS FOR MOVING MACHINE FORWARD OR IN REVERSE

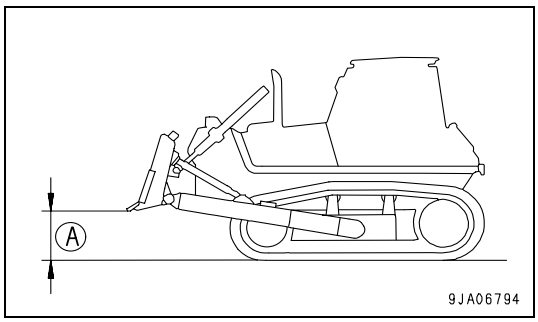
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check that the back-up alarm (alarm buzzer when machine travels in reverse) works properly.
- Fix the operator's compartment doors and windows in position securely.
- If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.



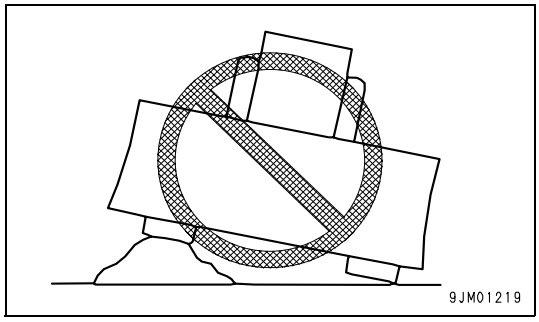
Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

PRECAUTIONS WHEN TRAVELING

- When traveling on level ground, keep the work equipment at a height of 40 to 50 cm (1.6 to 2.0 in) from the ground.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.



- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.

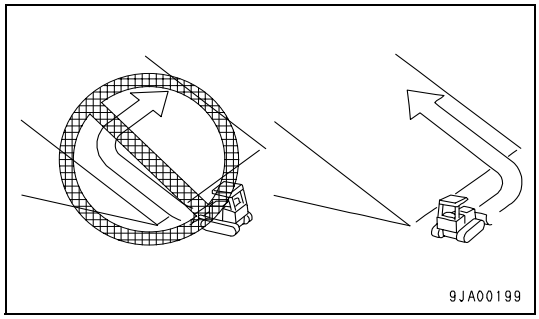


- Do not approach the edge of a cliff carelessly. When dropping soil over a cliff for banking or reclamation, leave soil of one scoop at the edge of the cliff and push it with the next scoop.
- When the machine passes over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, and there is danger that the travel speed rises suddenly. To prevent this, lower the travel speed.
- If the machine moves with only either side of the blade loaded, its tail may swing. Take care.

TRAVELING ON SLOPES

To prevent the machine from tipping over or slipping to the side, always do as follows.

- Keep the work equipment approx. 20 to 30 cm (8 to 12 in) above the ground. In case of emergency, lower the work equipment to the ground immediately to help stop the machine.
- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- When traveling down a slope, always place the transmission in low speed and travel down the slope slowly.



- When traveling downhill, never shift gear or place the transmission at neutral. It is dangerous not to use the braking force of the engine. Always place the transmission in a low gear before starting to travel downhill.

USING BRAKES

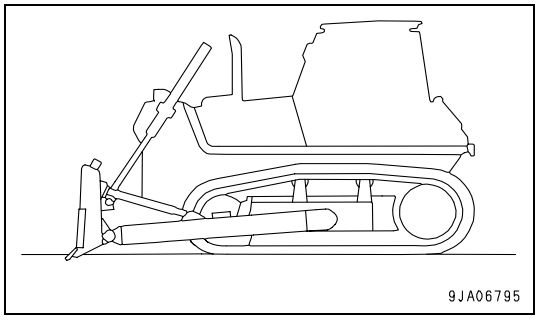
- When the machine is traveling, do not rest your foot on the brake pedal. If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal repeatedly if not necessary. If this is neglected, the brake will be overheated and will not work when required.
- When traveling downhill, use the braking force of the engine. If necessary, use the brake pedal at the same time.

OPERATE CAREFULLY ON SNOW

- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.
- When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while appling the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the blade to the ground to stop the machine.

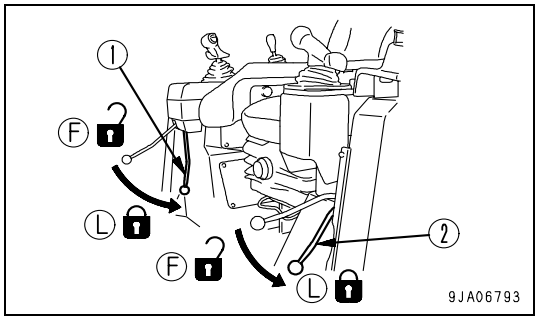
PARKING MACHINE

- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.

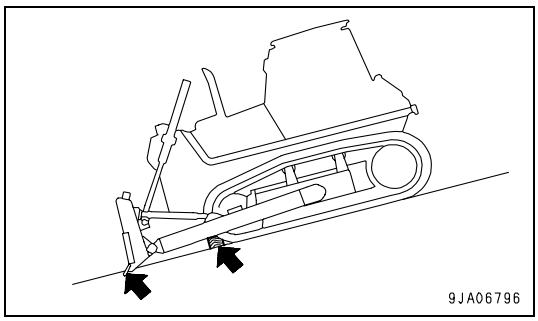


- When leaving the machine, set the steering, forward-reverse, gear shift lever in the NEUTRAL position and set the blade control lever in the HOLD position.

  Next, set both work equipment lock lever (1) and parking brake lever (2) to LOCK position (L), then stop the engine.
- Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.



- If it is necessary to park the machine on a slope, always do as follows.
  - Set the blade on the downhill side, then dig it into the ground.
  - Put blocks under the tracks to prevent the machine from moving.

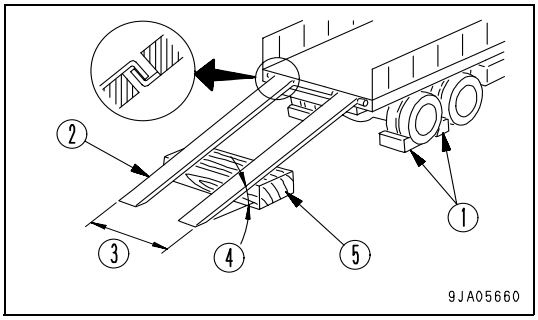


TRANSPORTATION

The machine can be divided into parts for transportation, so when transportating the machine, please contact your Komatsu distributor to have the work carried out.

LOADING AND UNLOADING

When loading or unloading the machine, mistaken operation may bring the hazard of the machine tipping over or falling, so particular care is necessary. Always do as follows.



(1) Blocks
(2) Ramp
(3) Width of ramps: Same width as track
(4) Angle of ramps: 15°
(5) Block

- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of the road or cliff.
- Always use ramps of adequate strength. Be sure that the ramps are wide, long, and thick enough to provide a safe loading slope. Take suitable steps to prevent the ramps from moving out of position or coming off.
- Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from machine-tracks. On a rainy day, in particular, be extremely careful since the ramp surface is slippery.
- Run the engine at low speed and travel slowly.
- When on the ramps, do not touch any other parts.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- For machines equipped with a cab, always lock the door after boarding the machine. If this is not done, the door may suddenly open during transportation.

  Refer to “TRANSPORTATION (3-118)“.

SHIPPING

When shipping the machine on a trailer, do as follows.

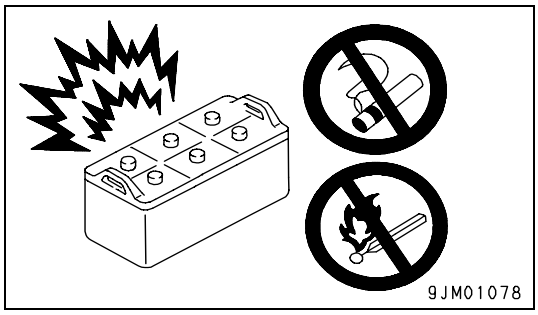
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see “TRANSPORTATION (3-118)“ in the OPERATION section.

BATTERY

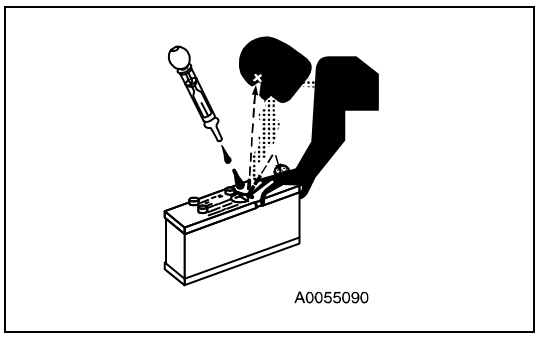
BATTERY HAZARD PREVENTION

Battery electrolyte contains sulphuric acid, and batteries generate flammable hydrogen gas, which may explode. Mistaken handling can lead to serious injury or fire. For this reason, always observe the following precautions.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- When working with batteries, always wear safety glasses and rubber gloves.
- Never smoke or use any flame near the battery.



- If you spill acid on your clothes or skin, immediately flush the area with large amount of water.
- If acid gets into your eyes, flush them immediately with large amount of water and seek medical attention.



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

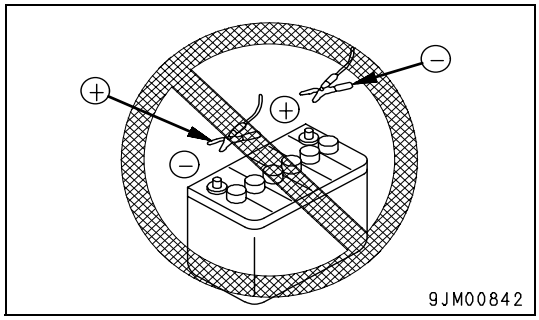
As there is a hazard that sparks will be generated, always do as follows.

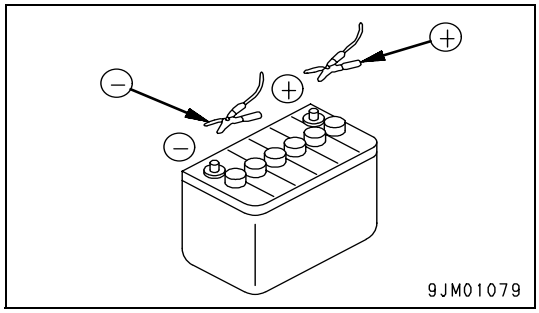
- Do not let tools or other metal objects make any contact between the battery terminals. Do not leave tools or other metal objects lying around near the battery.
- Always disconnect the negative (-) terminal (ground side) first when removing the battery; when installing the battery, connect the positive (+) terminal first, and connect the ground last. Tighten the battery terminals securely.
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.
- Tighten the battery caps securely.
- Install the battery securely to the determined place.

STARTING WITH BOOSTER CABLE

If any mistake is made in the method of connecting the booster cables, it may cause the battery to explode, so always do as follows.

- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator's seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety goggles and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see “STARTING ENGINE WITH BOOSTER CABLE (3-139)“ in the OPERATION section.





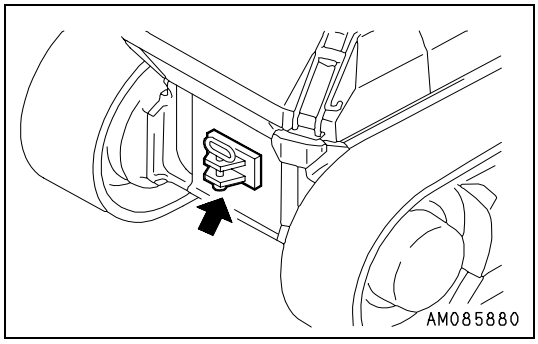
TOWING

WHEN TOWING

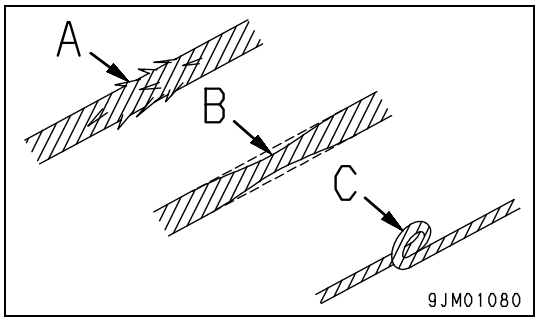
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing method, see section “MACHINE TOWING METHOD (3-132)“.

- Always wear leather gloves when handling wire rope.
- Connect a wire rope to the part indicated with the arrow in the diagram at right.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.



- 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 operation.



- If the engine stops or the oil pressure in the brake circuit drops because of trouble in the hydraulic system, the brake is applied and the machine cannot move. To move the machine, it is necessary to use a special device to raise the oil pressure in the brake circuit to the specified level and release the brake. For details of the method of releasing the brake, see “MACHINE TOWING METHOD (3-132)“.

PRECAUTIONS FOR MAINTENANCE

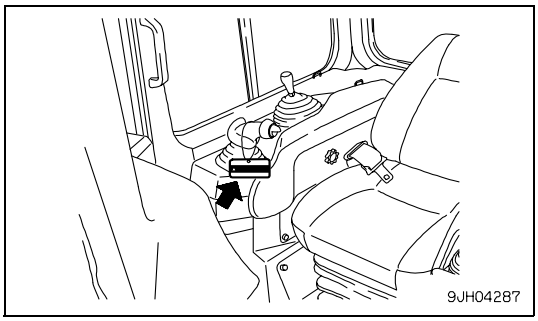
WARNING TAG

- Always attach the “DO NOT OPERATE“ warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine. Attach additional warning tags around the machine if necessary.

  Warning tag Part No. 09963-03001

  Keep this warning tag in the tool box while it is not used. If there is no toolbox, keep the tag in the operation manual pocket.

- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.



KEEP WORK PLACE CLEAN AND TIDY

Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean the tidy to enable you to carry out operations safely. If the work place is not kept claen and tidy, there is the danger that you will trip, slip, or fall over and injure yourself.

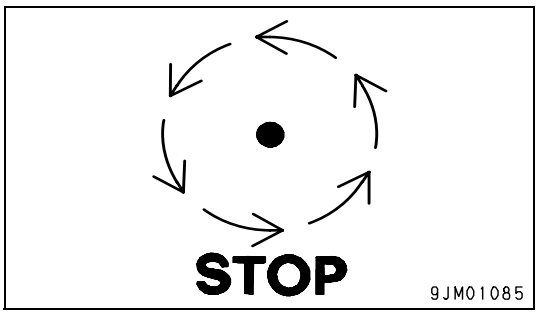
APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.

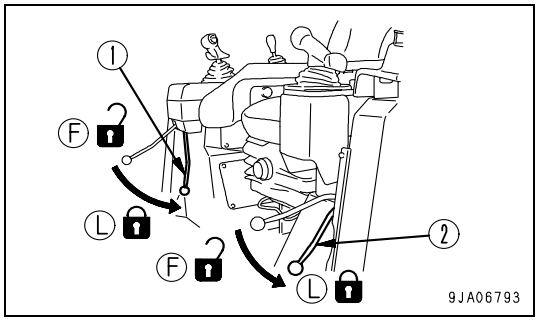
When working with others, misunderstandings between workers can lead to serious accidents.

STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

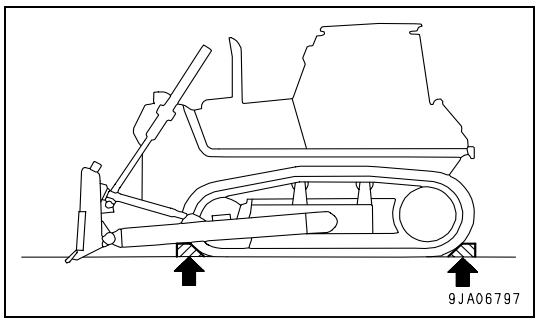
- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.



- Set work equipment lock lever (1) and parking barke lever (2) to the LOCK position (L).



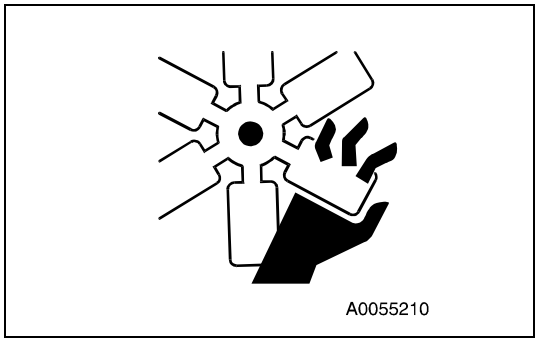
- Put blocks under the track to prevent the machine from moving.



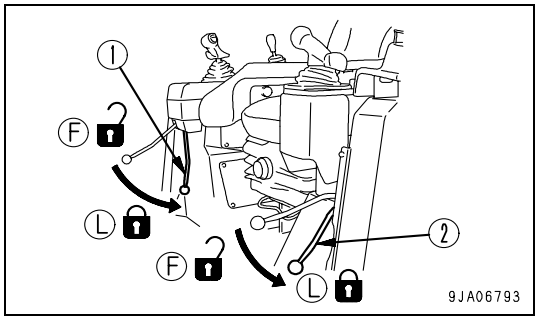
TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.

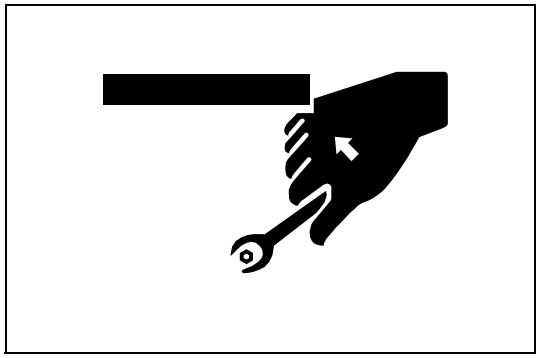


- Set work equipment lock lever (1) and parking barke lever (2) to the LOCK position (L).
- Do not touch any control levers. If any control lever must be operated, give a signal to the other workers to warn them to move to a safe place.



PROPER TOOLS

Use only tools suited to the task and be sure to use the tools correctly. Using damaged, low quality, faulty, makeshift tools or improper use of the tools could cause serious personal injury.



ACCUMULATOR

The accumulator is charged with high-pressure nitrogen gas. When handling the accumulator, careless procedure may cause an explosion which could lead to serious injury or property damage. For this reason, always observe the following precautions.

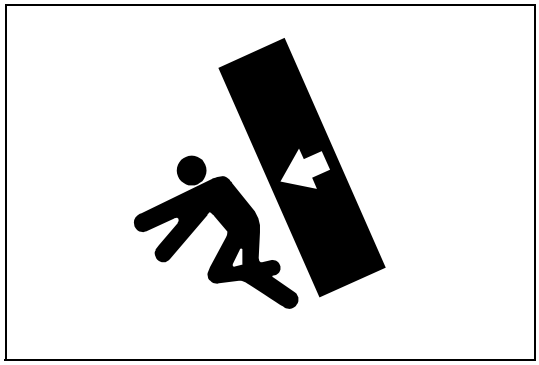
- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it, weld it, or use a cutting torch.
- Do not hit or roll the accumulator, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work performed.

NO UNAUTHORIZED PERSONNEL INTO AREA

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.

ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Place attachments that have been removed from the machine in a stable condition so that they do not fall. And take steps to prevent unauthorized persons from entering the storage area.



WORK UNDER THE MACHINE

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are lifted off the ground and the machine is supported only with the work equipment. If any of the control levers is touched by accident, or there is damage occurring to the hydraulic piping, the work equipment or the machine will suddenly drop. This is extremely dangerous. Never work under the work equipment or the machine.

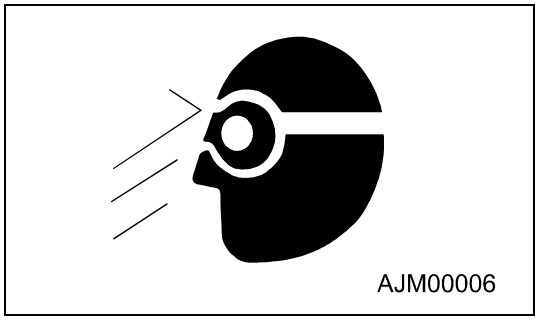
NOISE

If the noise from the machine is too loud, it may cause temporary or permanent hearing problems. When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

PRECAUTIONS WHEN USING HAMMER

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury. Always do as follows.

- If hard metal parts such as pins, bucket teeth, cutting edges, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause injury. Always wear safety goggles and gloves.
- When hitting pins or bucket teeth, there is a hazard that broken pieces might be sent flying and injure people in the surrounding area. Always check that there is no one in the surrounding area.



- There is a hazard that the pin hit with strong force may fly out and injure people in the surrounding area.

REPAIR WELDING

Welding operations must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

REMOVING BATTERY TERMINAL

When repairing the electrical system or when carrying out electrical welding, remove the negative (-) terminal of the battery to prevent the flow of current.

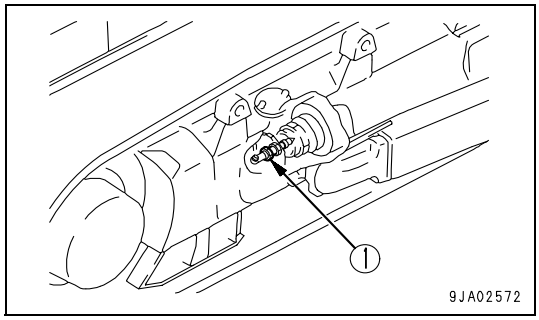
PRECAUTIONS WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION

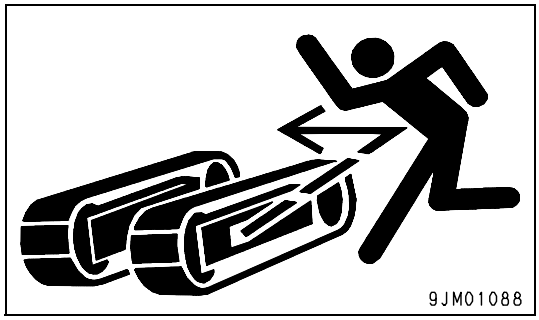
- Grease is pumped into the track tension adjustment system under high pressure.

  If the specified procedure for maintenance is not followed when making adjustment, grease drain plug (1) may fly out and cause serious injury or property damage.

- When loosening grease drain plug (1) to loosen the track tension, never loosen it more than one turn. Loosen the grease drain plug slowly.

- Never put your face, hands, feet, or any other part of your body close to grease drain plug (1).





DO NOT DISASSEMBLE RECOIL SPRING

Never attempt to disassemble the recoils spring assembly. It contains a spring under high pressure which serves as a shock absorber for the idler. If it is disassembled by mistake, the spring will fly out and cause serious injury. When it becomes necessary to disassemble it, ask your Komatsu distributor to do the work.

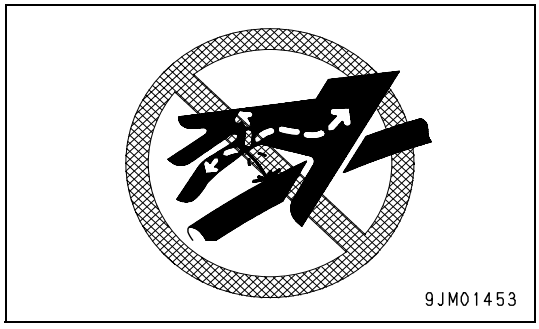
PRECAUTION WITH HIGH-PRESSURE OIL

The hydraulic system is always under internal pressure. When inspecting or replacing piping or hoses, always check that the pressure in the hydraulic circuit has been released. If the circuit is still under pressure, it will lead to serious injury, so always do as follows.

- Always release the pressure before starting any inspection or replacement operation.
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.

  When carry out inspection, wear safety glasses and leather gloves.

- There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly. If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.



HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.

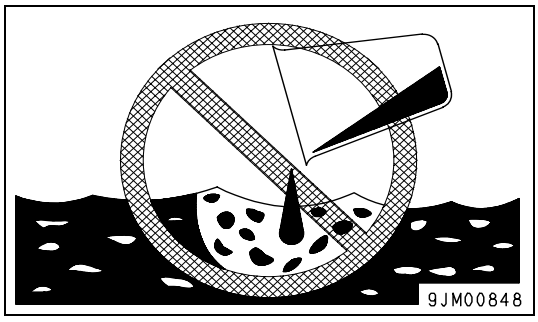
Replace the hose if any of the following problems are found.

- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement wire layer.
- Covering swollen in places.
- Twisted or crushed movable portion.
- Foreign material embedded in covering.

WASTE MATERIAL

To prevent pollution, pay careful attention to the method of disposing of waste materials.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground or dump into the sewage system, rivers, the sea, or lakes.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.



MAINTENANCE FOR AIR CONDITIONER

If air conditioner refrigerant gets into your eyes, it may cause blindness; if it touches your skin, it may cause frostbite.

Never touch refrigerant.

COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury caused by flying particles.
- When using compressed air to clean elements or the radiator, always wear safety goggles, dust mask, gloves, and other protective equipment.

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- In order for the machine to be operated safety for a long time, it is necessary to add oil and to carry out service and maintenance at periodic intervals. In order to further increase safety, components with a strong relationship to safety, such as hoses and seat belts, must be replaced at periodic intervals.

  Replacement of safety critical parts: See “PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (4-15)“.

- The material of these components naturally changes over time, and repeated use causes deterioration, wear, and fatigue. As a result, there is a hazard that these components may fail and cause serious injury or death. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety-critical parts if any defect is found, even when they have not reached the time specified interval.

OPERATION

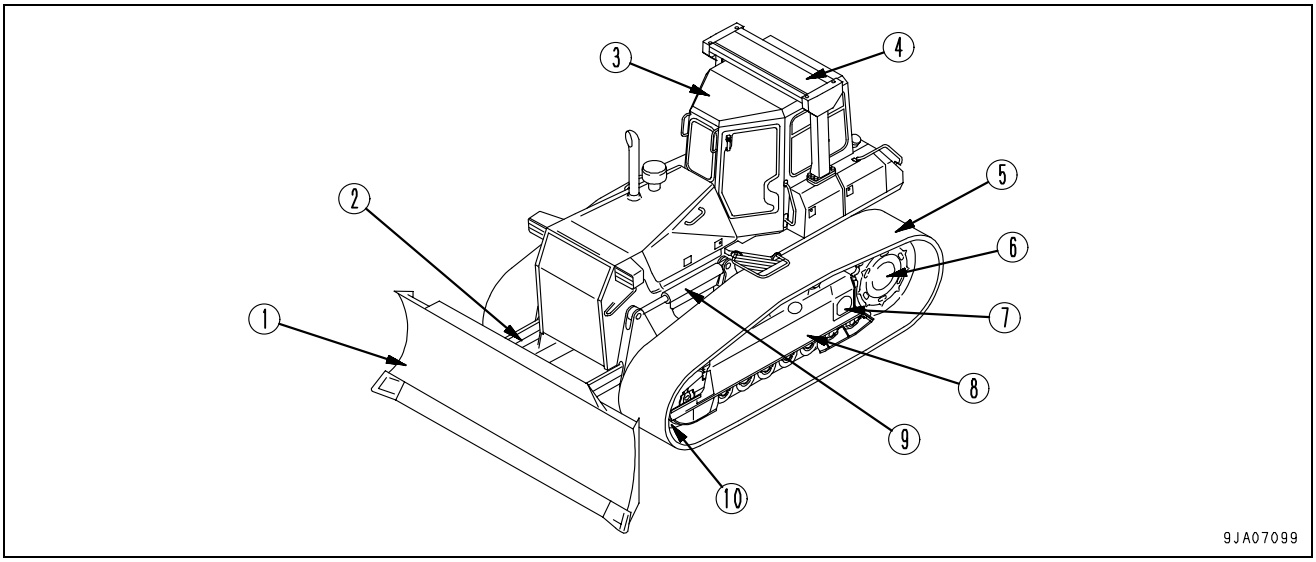
⚠ WARNING

Please read and make sure that you understand the SAFETY section before reading this section.

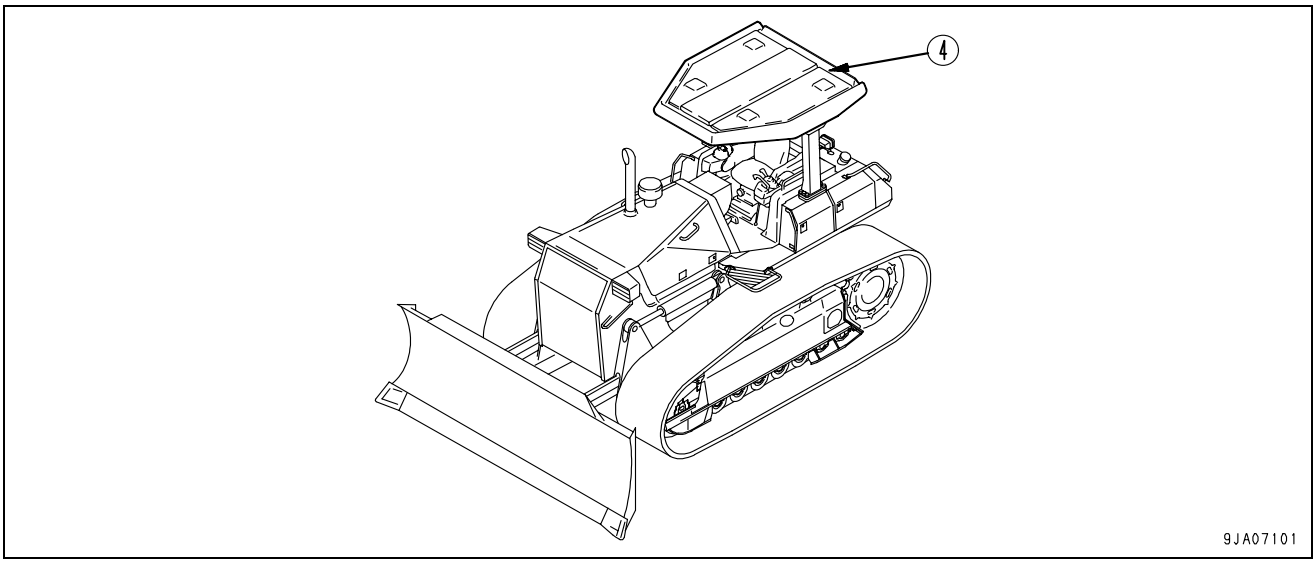
GENERAL VIEW

GENERAL VIEW OF MACHINE

Machine equipped with cab



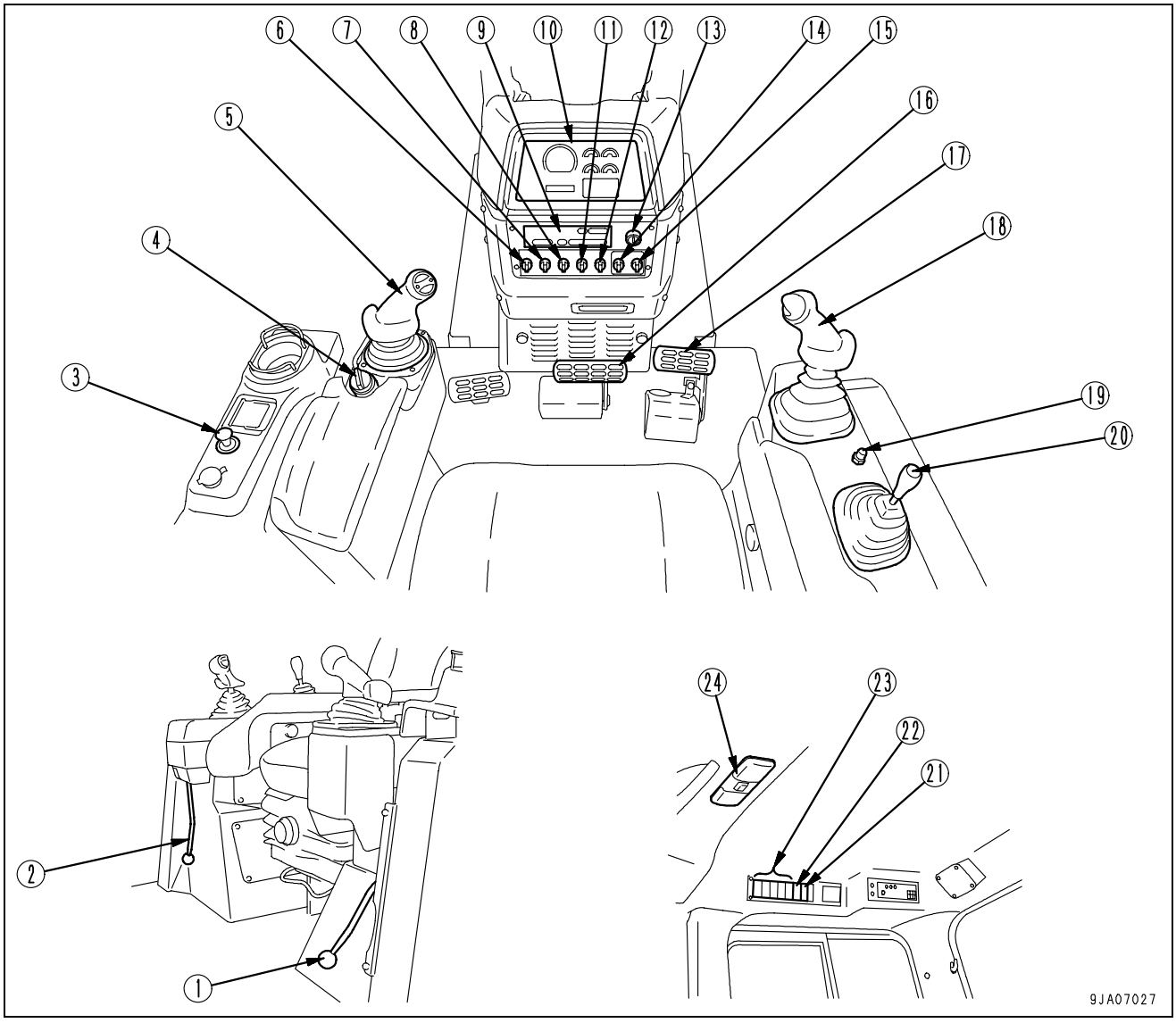
Machine equipped with canopy



(1) Blade
(2) Angle cylinder
(3) Cab
(4) ROPS canopy
(5) Track shoe
(6) Sprocket
(7) Pivot shaft
(8) Track frame
(9) Lift cylinder
(10) Idler
(11) Canopy

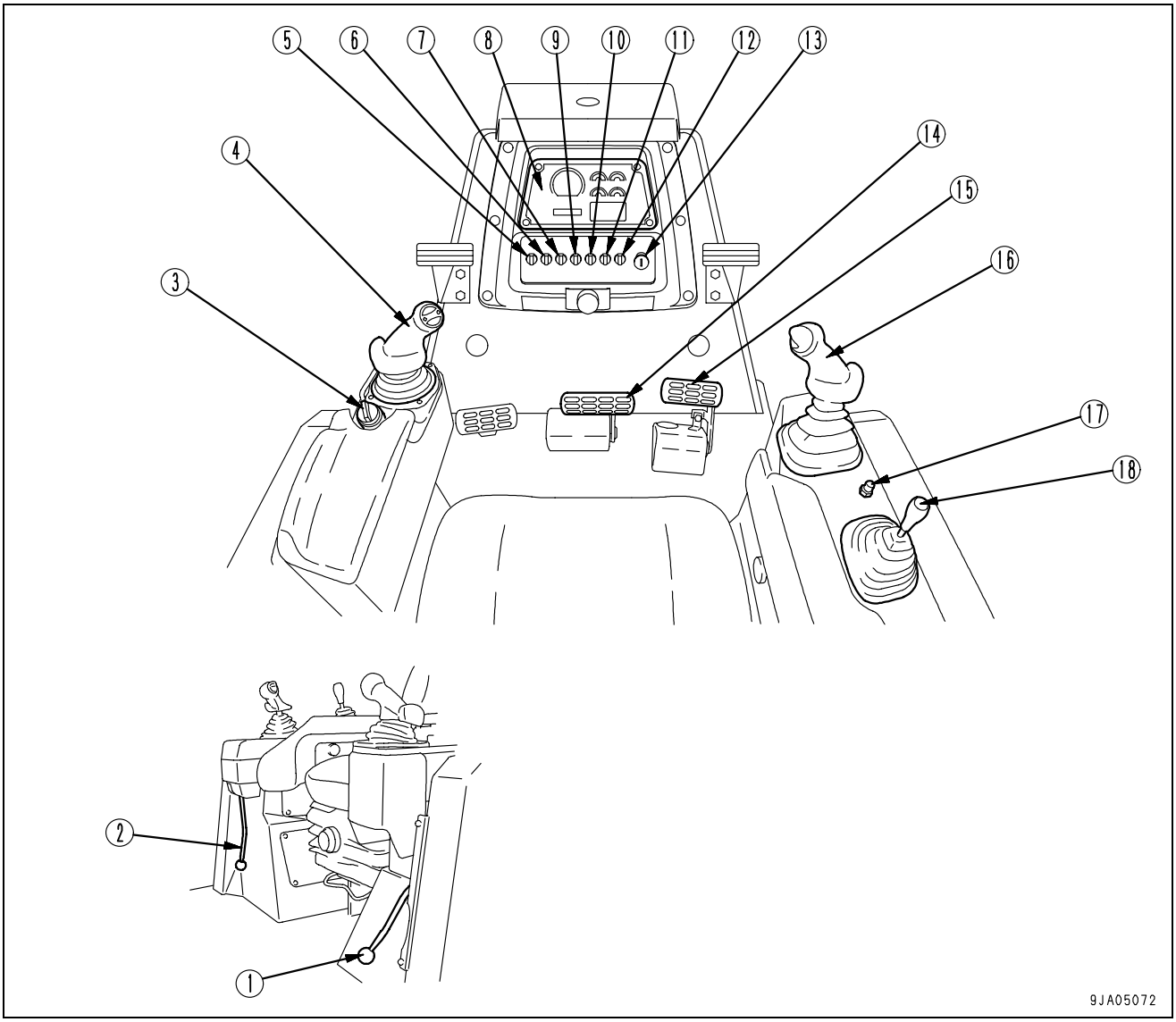
GENERAL VIEW OF CONTROLS AND GAUGES

Machine equipped with cab



(1) Parking brake lever
(2) Work equipment lock lever
(3) Cigarette lighter
(4) Fuel control dial
(5) Steering, forward-reverse, gear shift lever
(6) Auto shift down switch
(7) Preset mode switch
(8) Head lamp switch
(9) Air conditioner panel or heater panel
(10) Monitor panel
(11) Rear lamp switch
(12) Fan rotation selector switch
(13) Starting switch
(14) Information switch
(15) Buzzer cancel switch
(16) Brake pedal
(17) Decelerator pedal
(18) Blade control lever
(19) Horn switch
(20) Ripper control lever (if equipped)
(21) Rear glass heating switch (if equipped)
(22) Additional working lamp switch (if equipped)
(23) Wiper switch
(24) Room lamp switch

Machine equipped with canopy



(1) Parking brake lever
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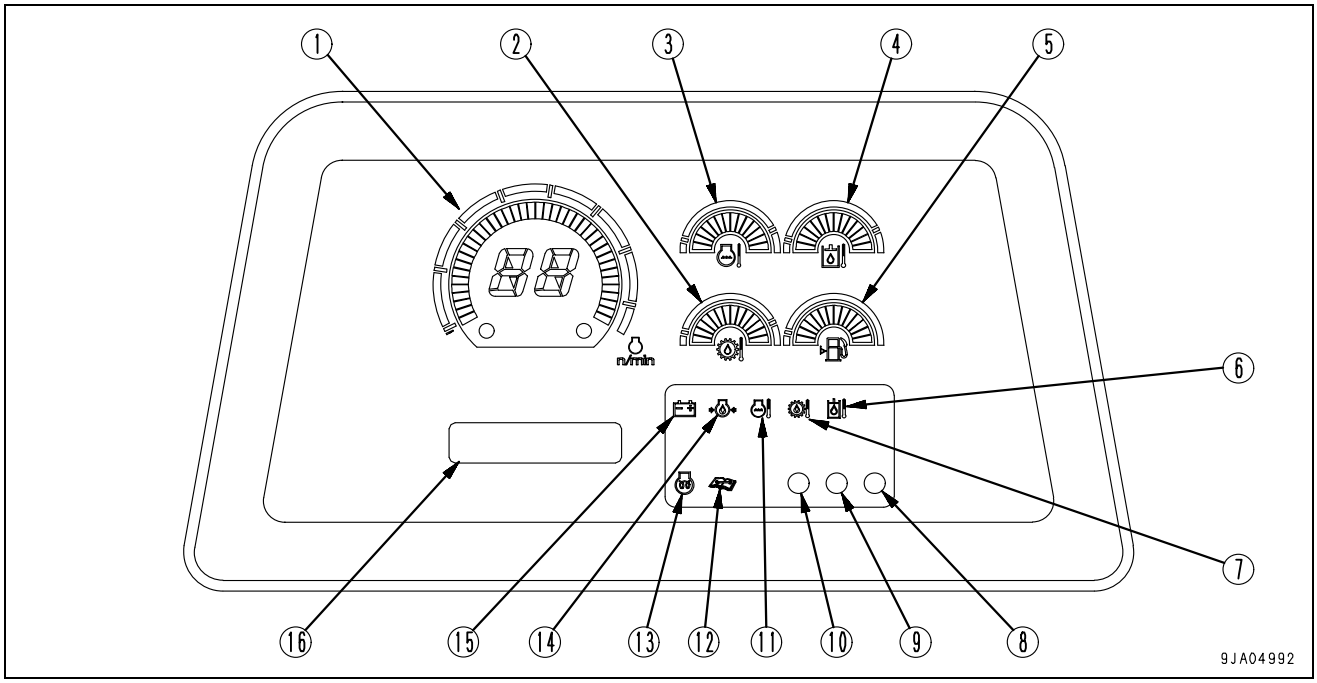
(16) Blade control lever
(17) Horn switch
(18) Ripper control lever (if equipped)

MONITOR PANEL



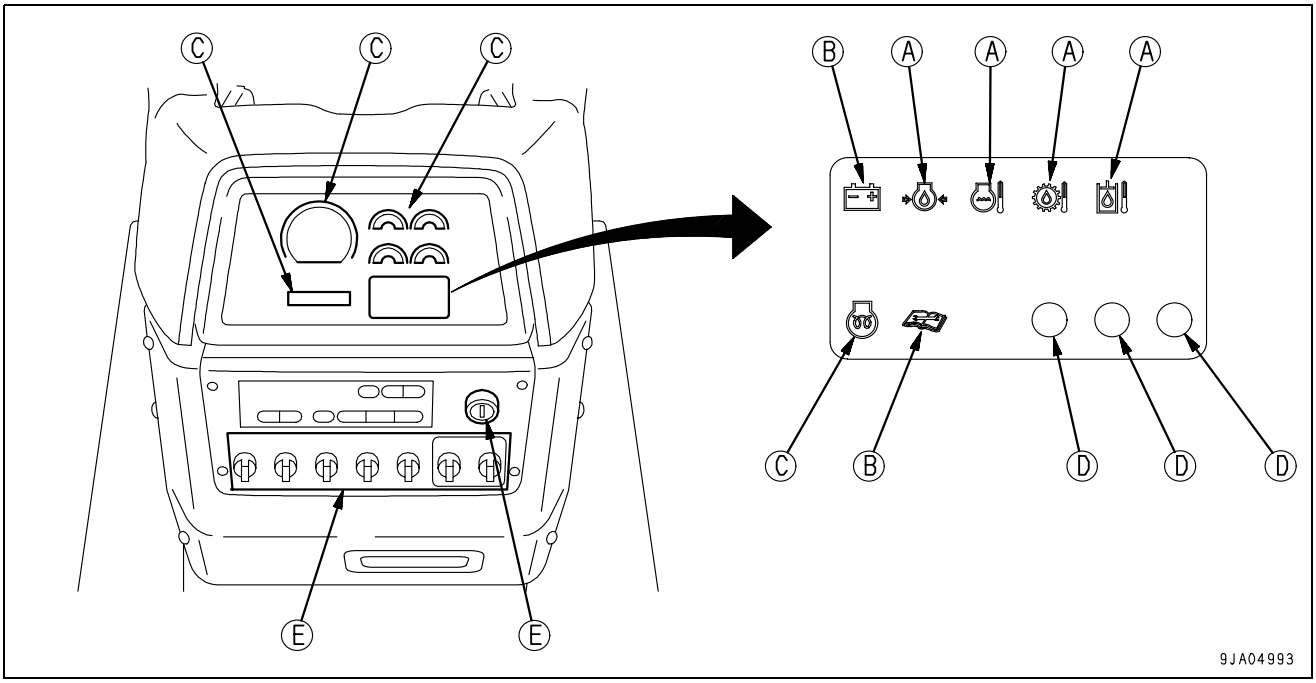
(1) Display panel A
(Speed range display, Engine speed)
(2) Power train oil temperature gauge
(3) Engine coolant temperature gauge
(4) Hydraulic oil temperature gauge
(5) Fuel level gauge
(6) Hydraulic oil temperature caution lamp
(7) Power train oil temperature caution lamp
(8) Fan operation confirmation lamp
(9) Filter/oil replacment interval lamp
(10) Warning lamp
(11) Engine coolant temperature caution lamp
(12) Maintenance caution lamp
(13) Engine preheating pilot lamp
(14) Engine oil pressure caution lamp
(15) Charge caution lamp
(16) Display panel B (multi-information)

EXPLANATION OF COMPONENTS

The following is an explanation of devices needed for operating the machine.

To perform suitable operations correctly and safely, it is important to completely understand methods of operating the equipment, and the meanings of the displays.

FRONT PANEL



(A) Emergency caution group
(B) Caution group
(C) Meter group
(D) Lamp
(E) Switch

CHECK MONITOR SYSTEM

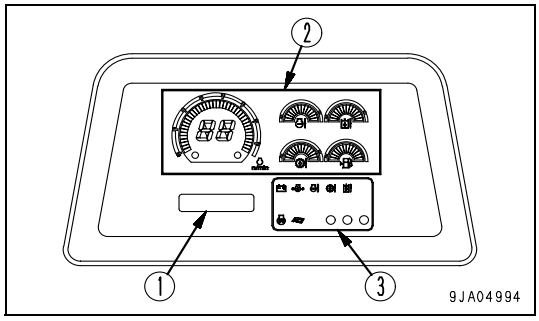
MONITOR SYSTEM

NOTICE

- **Stop the machine on level ground and carry out the monitor check.**
- **Stop the engine, then turn the starting switch to the ON position and check that the lamps light up for approx. 2 seconds. If they do not light up, please ask your Komatsu distributor to carry out inspection.**
- **The monitor check cannot be carried out until at least 5 seconds has passed after the engine was stopped.**

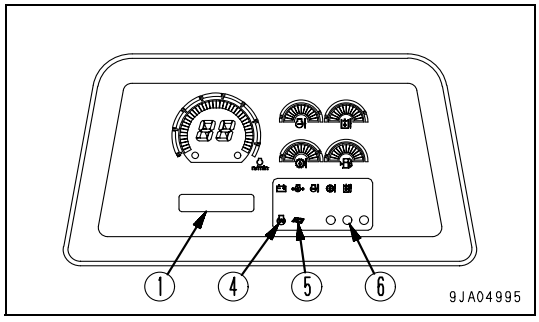
When carrying out the checks before starting, use the monitor system check.

1. Turn the starting switch to the ON position.
2. Check that the monitor liquid-crystal display and the lamps all light up for 2 seconds, that the alarm buzzer sounds for 2 seconds, and that “KOMATSU SYSTEM CHECK“ is displayed for 3 seconds on display panel B (multi-information) (1).
   - After 2 seconds, the current status of the machine is displayed on liquid-crystal display (2).
   - After 2 seconds, the lamp portion (3) goes out.
   - After 3 seconds, the operating mode is displayed on display panel B (multi-information) (1).



REMARK

The following cases do not indicate any problem.
If the preheating heater is actuated in cold weather, HEAT lamp (4) does not go out until the preheating is completed.
If the oil or filter replacement interval has been reached, maintenance caution lamp (5) or filter oil replacement interval lamp (6) light up or flash for 30 seconds, and the action code is displayed on display panel B (multi-information) (1).

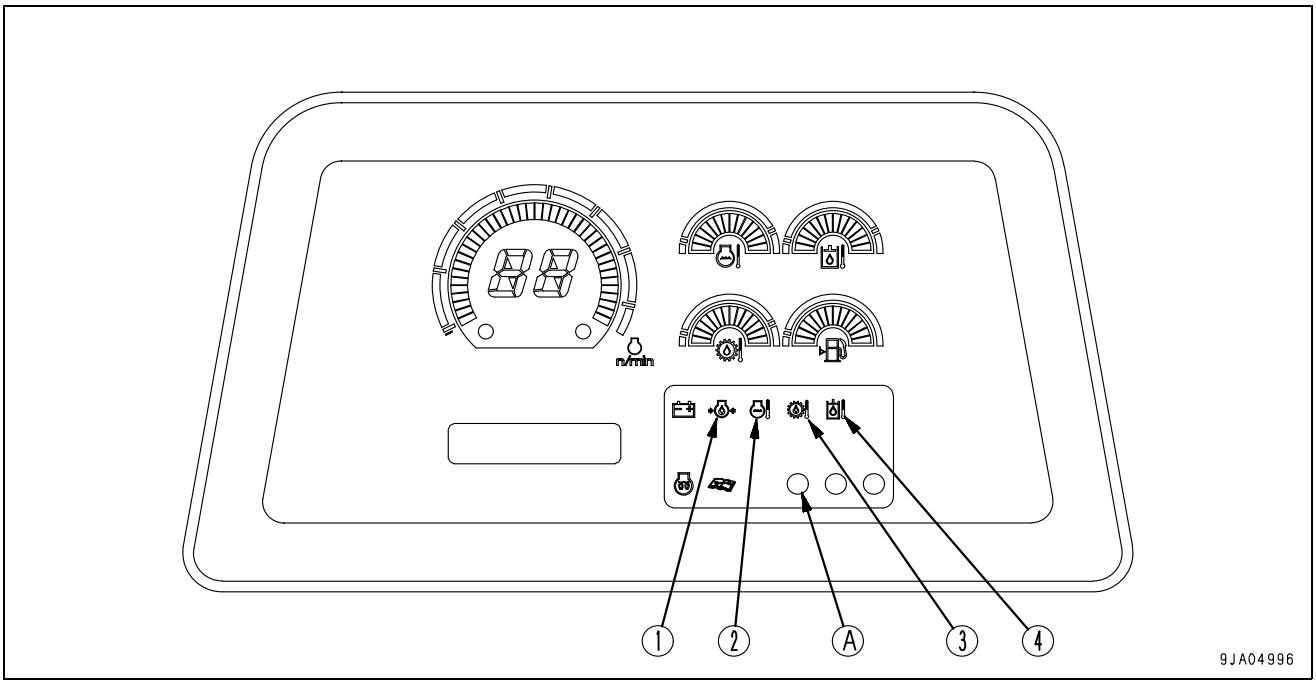


EMERGENCY CAUTION ITEMS

⚠ CAUTION

If any of the caution lamps begins to flash, stop the engine or reduce the engine speed to low idling immediately and check the trouble spot for necessary actions.

These items must be monitored when the engine is running. If there is any problem, the caution lamp for the location of the problem and warning lamp (A) flash, and the alarm buzzer sounds intermittently. Take the necessary action immediately.

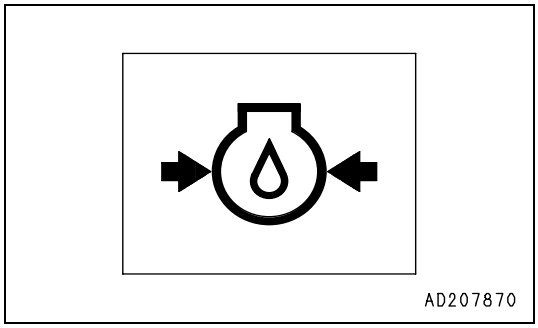


(1) Engine oil pressure caution lamp
(2) Engine coolant temperature caution lamp
(3) Power train oil temperature caution lamp
(4) Hydraulic oil temperature caution lamp

ENGINE OIL PRESSURE CAUTION LAMP

This lamp (1) indicates a low engine oil pressure.

If the monitor lamp flashes, stop the engine and check it immediately.

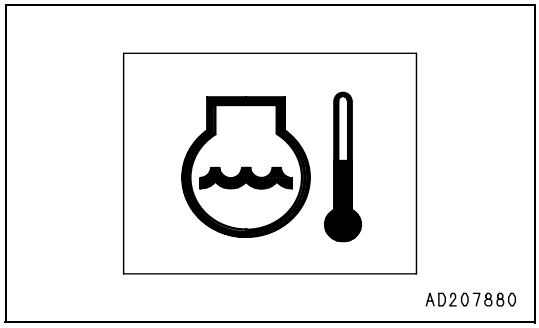


REMARK
The alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine oil has been changed. It does not indicate an problem.

ENGINE COOLANT TEMPERATURE CAUTION LAMP

This lamp (2) indicates a raise in the coolant temperature.

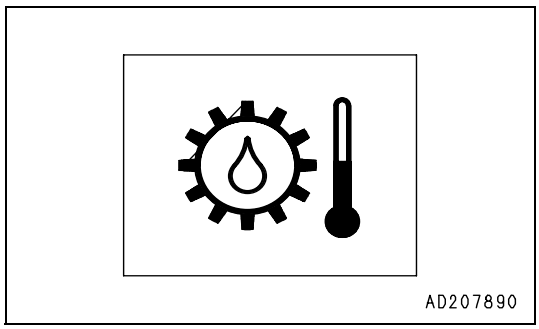
When the monitor lamp flashes, run the engine at low idling speed until green range of the engine coolant temperature gauge lights.



POWER TRAIN OIL TEMPERATURE CAUTION LAMP

This lamp (3) indicates a rise in the oil temperature of the torque converter outlet.

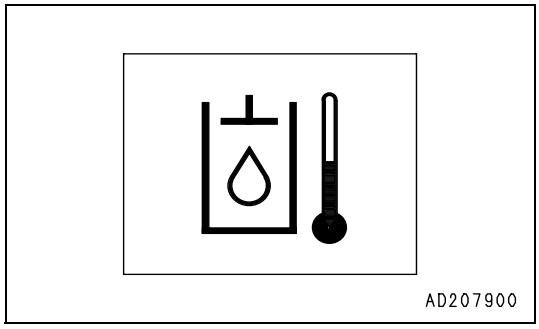
When the monitor lamp flashes, run the engine at the low idling speed until the green range of the power train oil temperature gauge lights.



HYDRAULIC OIL TEMPERATURE CAUTION LAMP

Lamp (4) indicates a rise in the hydraulic oil temperature.

When the monitor lamp flashes, stop the machine and run the engine at the low idling speed until oil temperature falls.

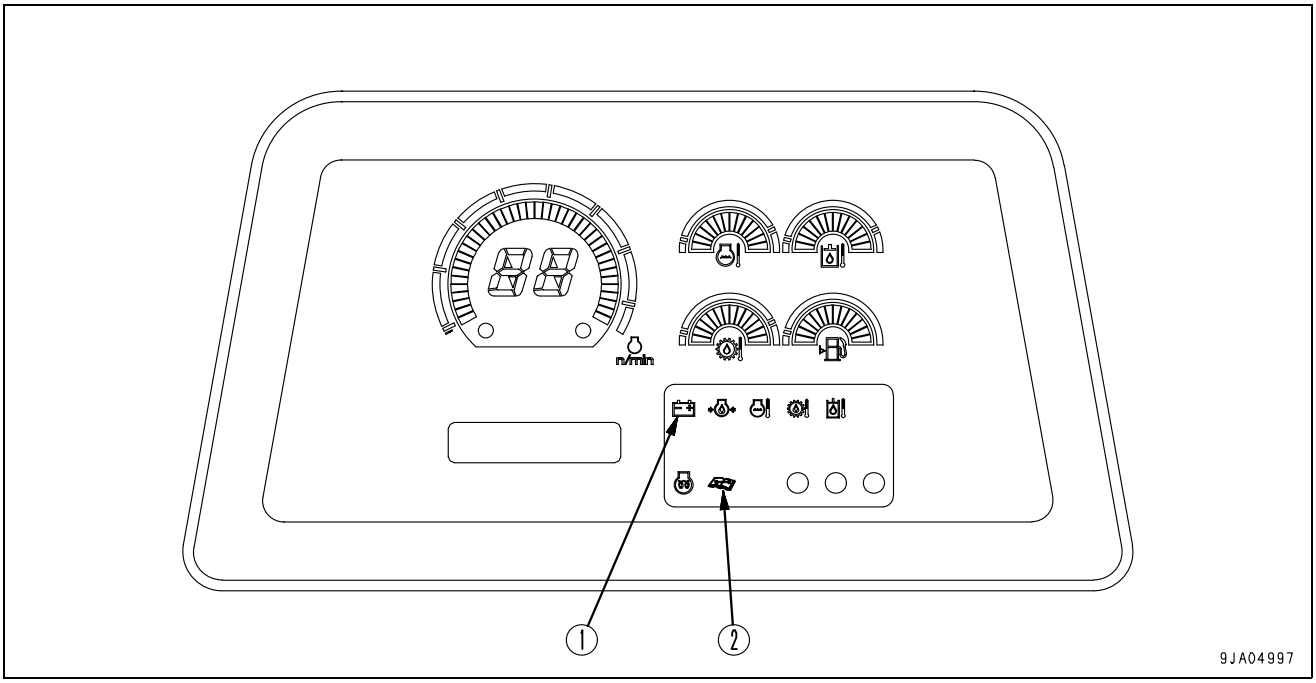


CAUTION ITEMS

⚠ CAUTION

If these caution lamps item flash, check and repair the appropriate location as soon as possible.

These are items which need to be observed when the engine is running. If any problem occurs, the item needing immediate repair is displayed. If there is any problem, the problem location on the caution lamp will flash.

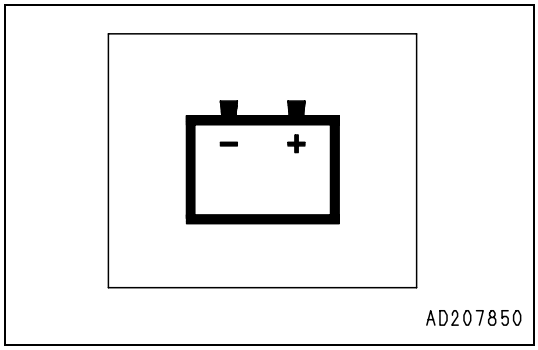


(1) Battery charge circut caution lamp (2) Maintenance caution lamp

BATTERY CHARGE CIRCUIT CAUTION LAMP

This lamp (1) indicates an problem in the charging system while the engine is running.

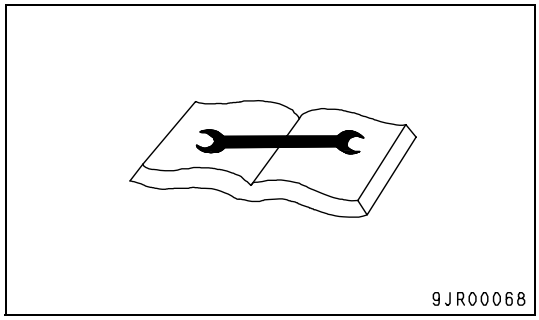
If the monitor lamp flashes, check the V-belt tension. If any problem is found, see “OTHER TROUBLE (3-142)“.



REMARK
This monitor lamp lights when the starting switch is turned to ON immediately after the engine is started or immediately before the engine is stopped. It does not indicate an problem.

MAINTENANCE CAUTION LAMP

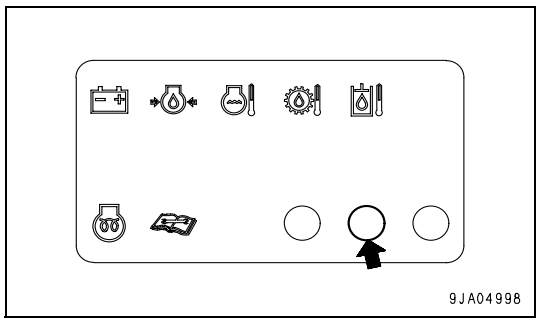
This lamp (2) lights up for approx. 30 seconds after the starting switch is turned to the ON position if the filter or oil replacement interval has been reached.



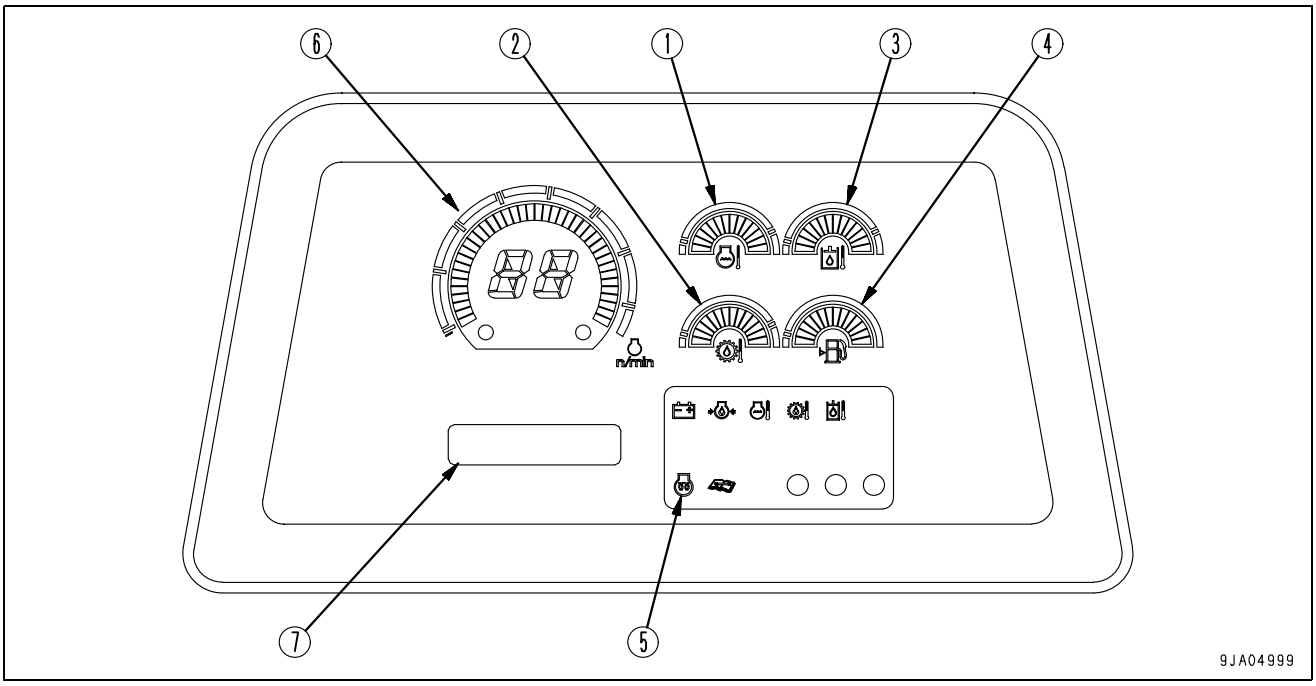
After replacing the indicated filter or oil displayed on display panel B (multi-information), reset the interval. For details, see “METHOD OF USING OIL AND FILTER MAINTENANCE MODE (3-26)“.

The lamp goes out.

REMARK
At the same time, the filter or oil replacement interval lamp also lights up or flashes.



METER GROUP



(1) Engine coolant temperature gauge
(2) Power train oil temperature gauge
(3) Hydraulic oil temperature gauge
(4) Fuel level gauge
(5) Engine preheating pilot lamp
(6) Display panel A
(Speed range display, Engine speed)
(7) Display panel B (multi-information)

ENGINE COOLANT TEMPERATURE GAUGE

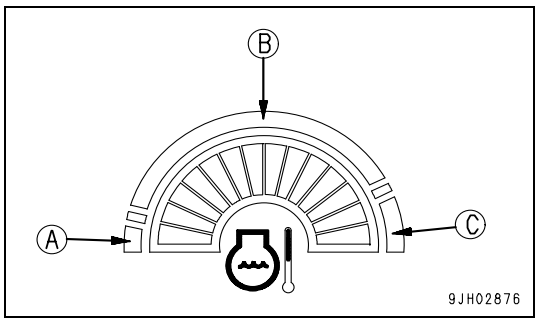
NOTICE
If the coolant temperature gauge often enters red range (C), check the radiator for clogging.

Gauge (1) indicates temperature of the engine coolant.

If the temperature is normal during operation, green range (B) will light.

If red range (C) lights during operation, move the fuel control dial to lower engine speed tp approx. 3/4 of the full speed, and run until the coolant temperature enters green range (B).

If red range (C) lights up during operation, and the engine coolant temperature caution lamp flashes and the alarm buzzer sounds, stop the machine, run the engine at low idle, and wait for the coolant temperature to return to green range (B).



(A): White range

(B): Green range

(C): Red range

POWER TRAIN OIL TEMPERATURE GAUGE

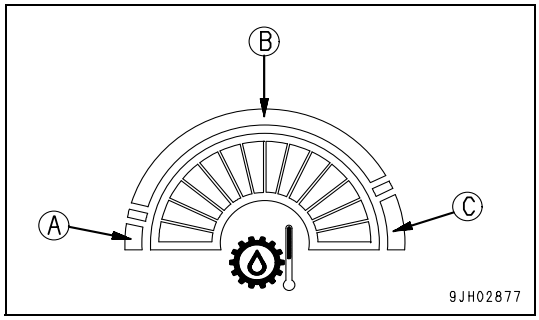
NOTICE
If the power train oil temperature gauge often enters the red range (C), we recommend you to lower the travel speed one range (for example, F2 → F1) to reduce the load on the power train when operating.

Gauge (2) indicates the torque converter outlet oil temperature.

If the temperature is normal during operation, green range (B) will light.

If red range (C) lights up during operation, move the fuel control dial to lower engine speed to approx. 3/4 of the full speed, reduce the load and run until the oil temperature enters green range (B).

If red range (C) lights up during operation, and the power train oil temperature caution lamp flashes and the alarm buzzer sounds, stop the machine, run the engine at low idle, and wait for the oil temperature to go down to green range (B).



(A): White range

(B): Green range

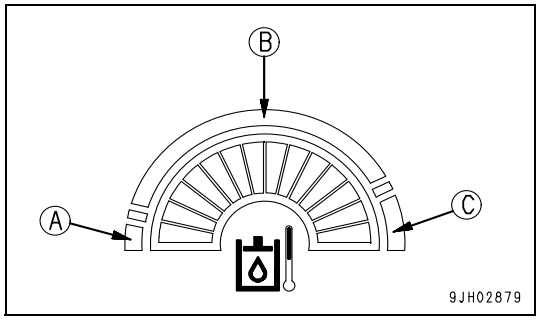
(C): Red range

HYDRAULIC OIL TEMPERATURE GAUGE

Gauge (3) indicates the hydraulic oil temperature.

If the temperature is normal during operation, green range (B) will light.

If the red range (C) lights up during operation, move the fuel control lever to lower the engine speed to approx. 3/4 of the full speed, reduce the load and run until the oil temperature enters the green range (B).



(A): White range

(B): Green range

(C): Red range

FUEL LEVEL GAUGE

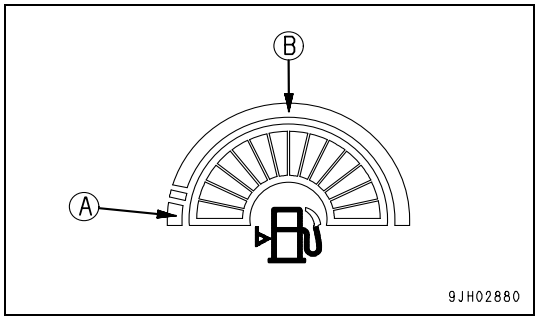
Gauge (4) fuel level in the fuel tank.

During normal operation, the green range (B) should be lighted up.

If red range (A) lights up during operation, add fuel immediately.

(A): Red range

(B): Green range

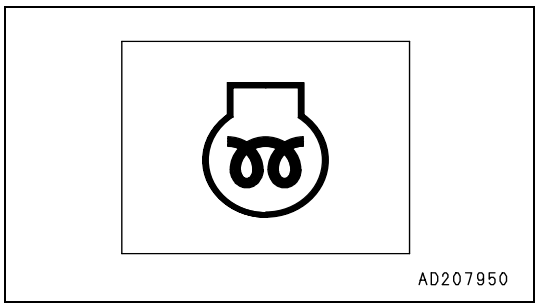


REMARK
The display is not proportional to the amount of fuel remaining. If only the red range (A) lights up, there is less than 56 liters (14.80 US gal) of fuel remaining.

ENGINE PRE-HEATING PILOT LAMP

This lamp (5) indicates that the engine is being preheated with an electric heater in cold weather.

When the engine starting switch is turned to the ON position, the controller detects the engine coolant temperature and automatically starts to preheat the engine at low temperature.



DISPLAY PANEL A (speed range display, engine speed)

Meter (6) displays the transmission speed range being used on the machine and engine speed.

- The travel direction (A) and speed range (B) are displayed in the center of the speed range display.

  (A) F: FORWARD

  R: REVERSE

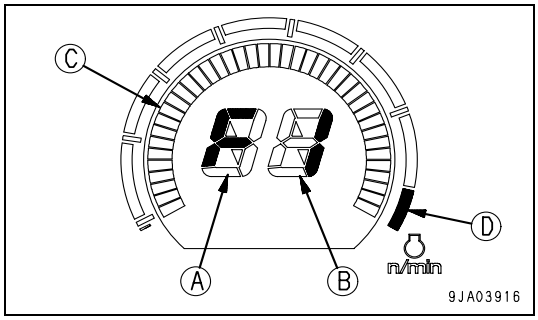
  N: Neutral

  P: Parking brake lever at LOCK position

  (B) 1: 1st

  2: 2nd

  3: 3rd



Example: F1 is displayed for FORWARD 1st

- Bar graph (C) around the outside of the display shows the engine speed.

  If the bar graph reaches red range (D) during operation, take action to reduce the engine speed. Always keep the bar graph in the green range.

DISPLAY PANEL B (multi-information)

The top and bottom lines in display panel B (multi-information) display information related to the condition of the machine.

The content of the display is divided into “OPERATING MODE“ and “MAINTENANCE MODE“. Use the buzzer cancel switch to switch between the operating mode and maintenance mode.

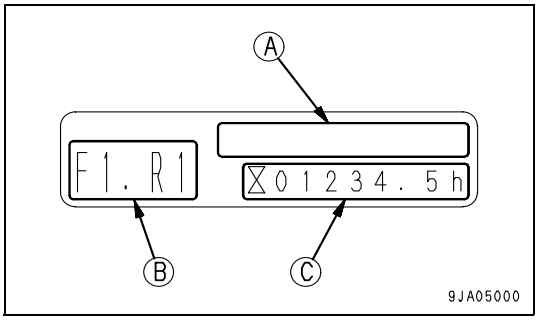
For details of switching the mode, see “BUZZER CANCEL SWITCH (3-23)“.

OPERATING MODE (default screen)

Use this mode when operating the machine.

REMARK
When the starting switch is turned from the OFF position to the ON position, display panel B (multi-information) always displays the operating mode.

The following information is displayed by the operating mode.



Top line (A): Action code

If any problem occurs on the machine, an action code is displayed. If an action code appears, take the applicable action. For details, see “OTHER TROUBLE (3-142).

This displays various types of filter or oil replacement intervals have been reached.

Bottom line, left (B): Preset mode

When the preset mode switch is ON, the selected preset mode is displayed.

For details of selecting the preset mode, see “GEARSHIFTING OPERATION USING PRESET MODE FUNCTION (3-102)“.

Bottom line, right (C): Service meter or engine speed

Use the information switch to switch the display between the service meter and engine speed. For details of switching the display, see “INFORMATION SWITCH (3-23)“.

Service meter

This displays the total number of hours that the machine has been operated. Use the display to determine the intervals for periodic maintenance.

While the engine is running, the service meter advances, even if the machine is not being operated.

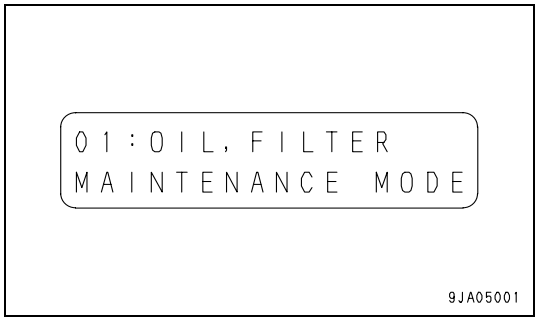
While the engine is running, the hourglass mark at the side of the meter flashes to show that the meter is advancing.

The meter advances 0.1h for every 6 minutes that the engine is running, regardless of the engine speed.

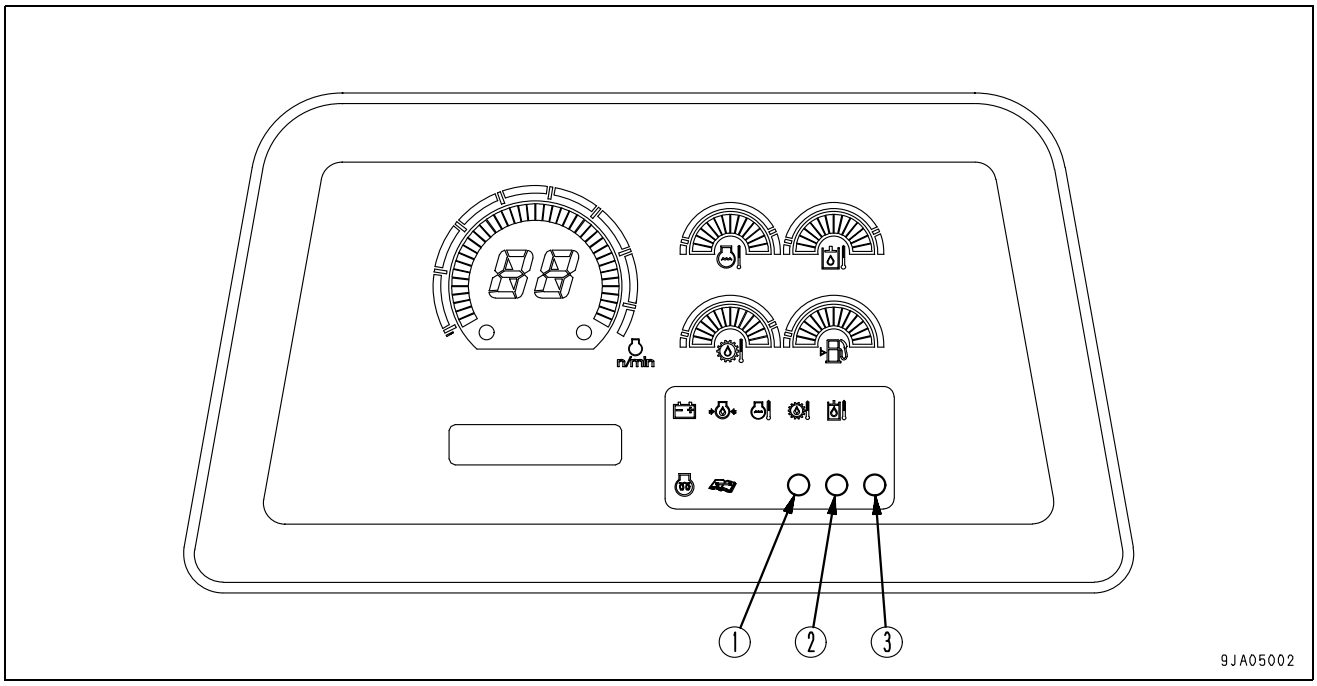
Maintenance mode

This displays various types of information related to maintenance of the machine.

For details, see “METHOD OF USING MAINTENANCE MODE (3-24)“.



LAMPS



(1) Warning lamp
(2) Filter/oil replacement interval lamp
(3) Fan operation confirmation lamp

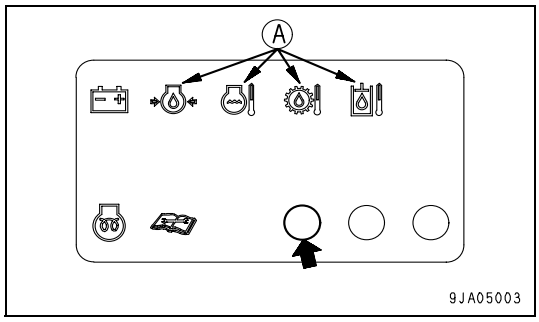
WARNING LAMP

(Red)

NOTICE
If alarm buzzer sounds, stop work immediately and perform inspection and maintenance of the appropriate point.

This lamp (1) flashes when the caution lamp flashes and when an action code is displayed on display panel B (multi-information).

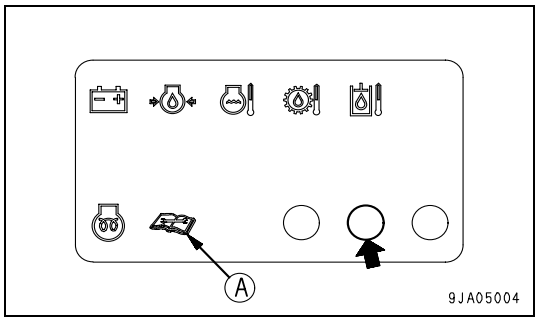
When the caution lamp (A) of an emergency warning item flashes, or when the part of an action code is displayed, the alarm buzzer sounds continuously at the same time.



FILTER/OIL REPLACEMENT INTERVAL LAMP

(Yellow)

If it is time to replace a filter or change the oil, this lamp (2) lights up or flashes for approx. 30 seconds after the starting switch is turned ON.



REMARK
This lamp (2) lights up if there is less than 30 hours remaining until replacement, and flashes when the replacement interval has passed.
At the same time, maintenance caution lamp (A) also lights up.

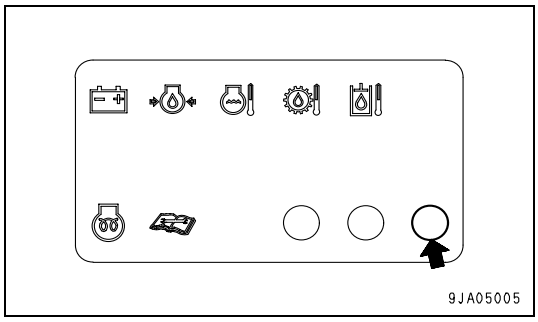
After replacing the indicated filter or oil displayed on display panel B (multi-information), reset the time. For details, see "METHOD OF USING OIL AND FILTER MAINTENANCE MODE (3-26)".

The lamp goes out or stops flashing.

FAN OPERATION CONFIRMATION LAMP

(Orange)

This lamp (3) flashes in the following situations.

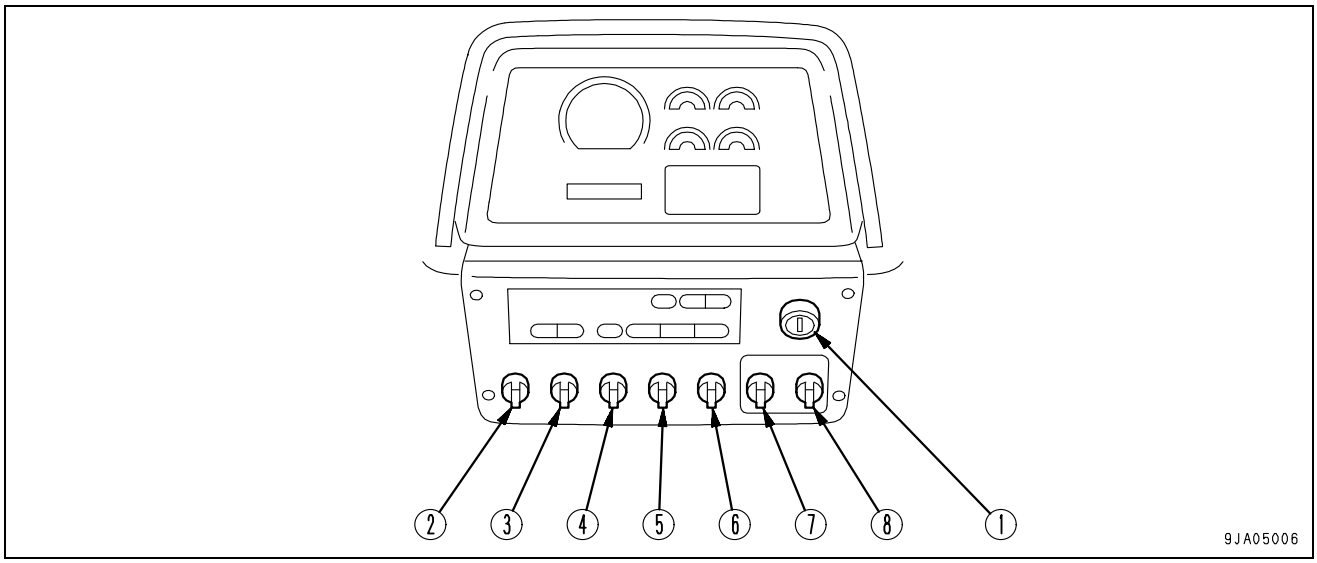


- When the direction of cooling fan rotation does not switch even when the fan is operated to rotate in the reverse direction.
- During the time from the point where the starting switch is turned ON to the point where the engine starts when the engine is started with the fan set to reverse rotation or cooling.
- When the hydraulic circuit is in protected status.

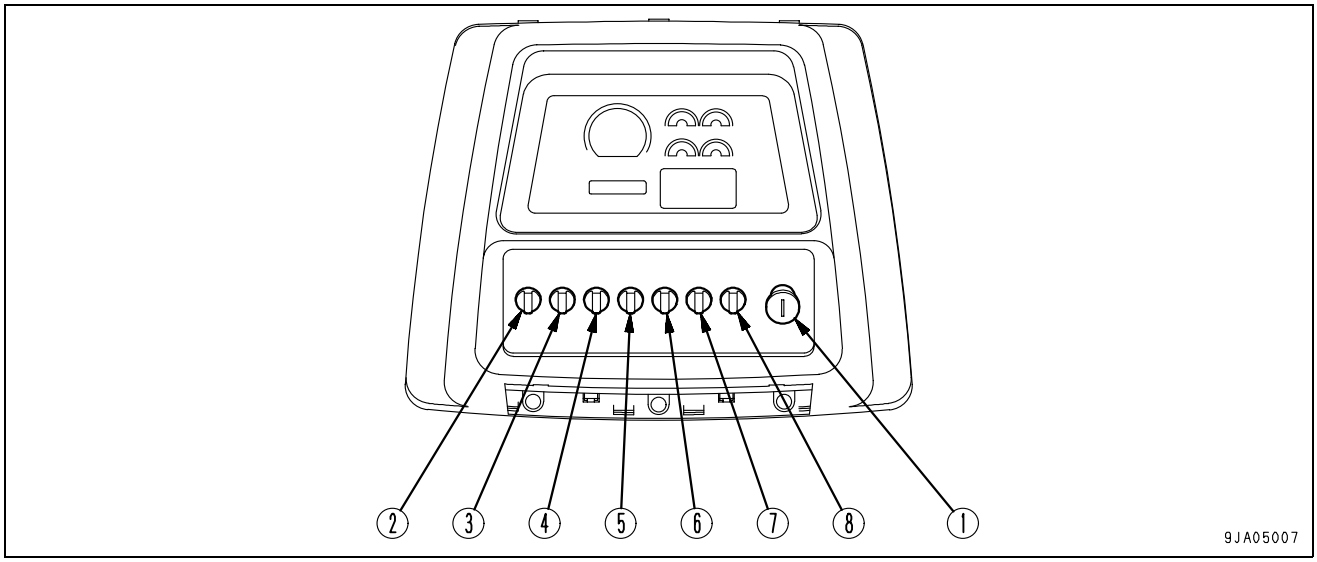
For details, see "FAN ROTATION SELECTOR SWITCH (3-22)".

SWITCHES

Machine equipped with cab



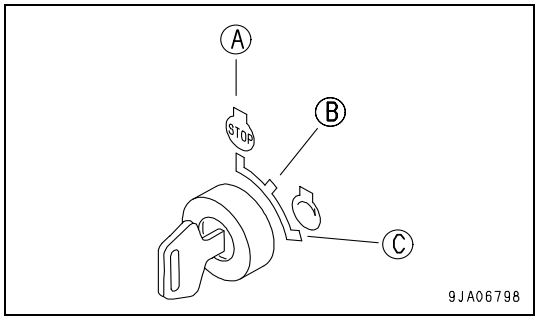
Machine equipped with canopy



(1) Starting switch
(2) Auto shift down switch
(3) Preset mode switch
(4) Head lamp switch
(5) Rear lamp switch
(6) Fan rotation selector switch
(7) Information switch
(8) Buzzer cancel switch

STARTING SWITCH

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



(A): OFF position

At this position, the starting switch key can be inserted and removed. When the switch is turned to this position, all the electric circuits are turned off and the engine stops.

(B): ON position

In this position, electric current flows in the charging and lamp circuits.

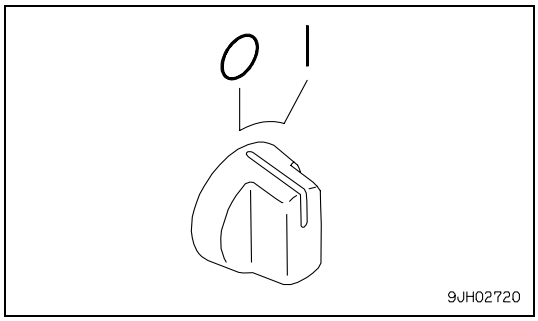
Keep the starting switch key at the ON position while the engine is running.

(C): START position

This is the position to start the engine. Hold the key at this position while cranking the engine. Release the key immediately after the engine has been started. The key will return to ON position (B) when released

AUTO SHIFT DOWN SWITCH

This switch (2) is used to actuate the auto shift down function and shift the transmission automatically to a low speed range.



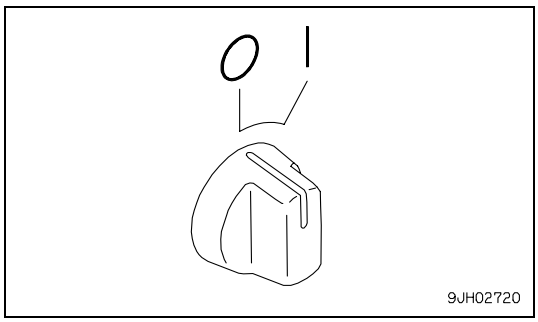
○ (OFF) position: Stopped

I (ON) position: Actuated

For details, see “AUTO DOWN SHIFT OPERATION (3-103)“.

PRESET MODE SWITCH

This switch (3) is used to actuate the preset mode function.



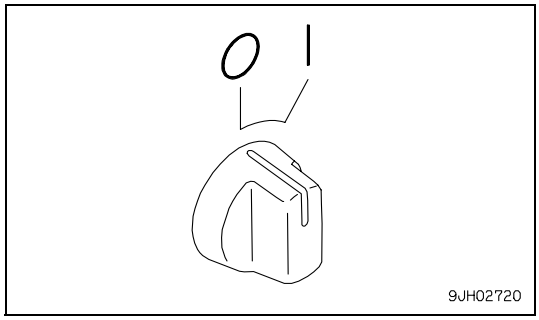
○ (OFF) position: Stopped

I (ON) position: Actuated

For details, see “GEARSHIFTING OPERATION USING PRE-SET MODE FUNCTION (3-102)“.

HEAD LAMP SWITCH

This switch (4) lights up when the front lamp, and panel lamp light up.

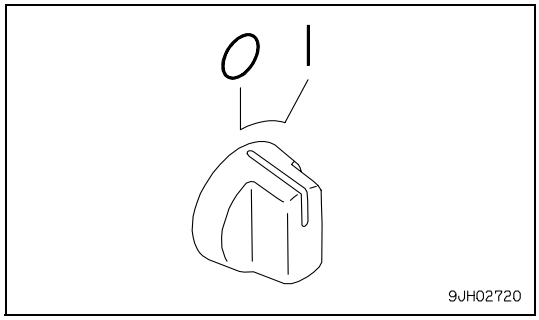


○ (OFF) position: Lights out

I (ON) position: Lights on

REAR LAMP SWITCH

This switch (5) lights up the rear lamps.

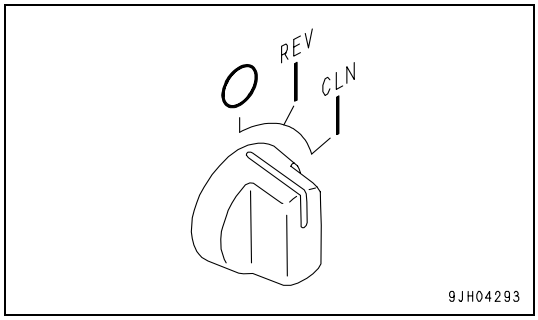


○ (OFF) position: Lights out

I (ON) position: Lights on

FAN ROTATION SELECTOR SWITCH

This switch (6) is used to switch the direction of rotation of the cooling fan.



○ position : Normal rotation

Normally use this position.

The air is pushed out to the front through the radiator mask.

The speed of the fan changes to match the temperature of the coolant in order to improve the cooling efficiency.

REV position: Reverse rotation

The fan rotates in the reverse direction.

The air is sucked into the engine room through the radiator mask. This makes it possible to use the heat from the radiator to warm the operator's cab.

Operating with the fan rotating in reverse may cause overheating, so use this function only during cold weather (ambient temperature below 15°C).

CLN position: Cleaning

The fan rotates in the reverse direction at high speed, regardless of the coolant temperature.

Use this function to clean the radiator fins.

Stop the engine and turn the starting switch to the ON position before operating this switch.

REMARK

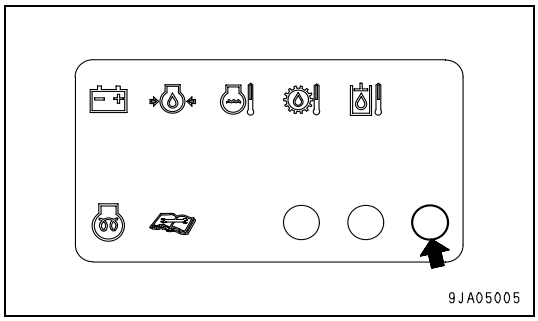
If the engine is running, the direction of rotation of the fan will not change even when the fan rotation selector switch is operated.

The fan operation confirmation lamp will flash to inform the operator that the direction of rotation of the fan has not changed.

Stop the engine, then start it again. The direction of rotation of the fan will be switched.

When the cooling fan is being operated in reverse or in the cleaning mode, even if the starting switch is turned to the OFF position, the hydraulic circuit protection function will be actuated and the power supply will not be cut immediately.

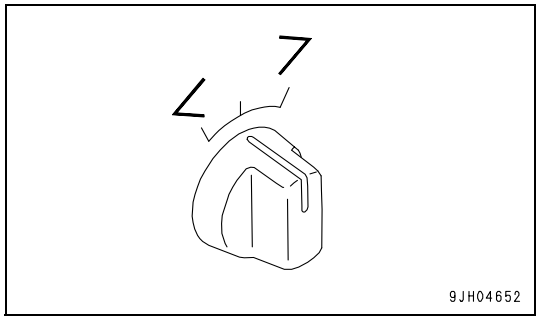
During this time, the fan operation confirmation lamp will flash to inform the operator that the power supply is being maintained.



INFORMATION SWITCH

This switch (7) is used to operate display panel B (multi-information).

When the switch is released, it returns automatically to the center position.



- **When display panel B (multi-information) is in the operation mode**

  turn the switch to < or > to switch the display to service meter or engine speed.

- **When display panel B (multi-information) is in the maintenance mode**

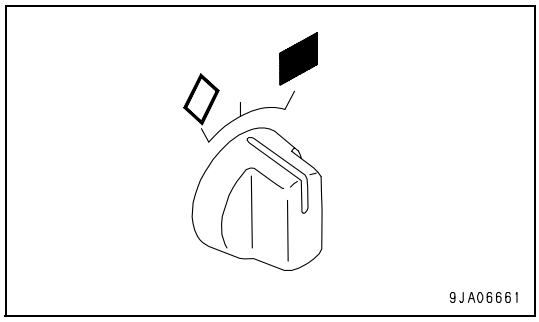
  It is used to move between sub modes, between items, to move the cursor, or to change values.

  For details, see “METHOD OF USING MAINTENANCE MODE (3-24)“.

BUZZER CANCEL SWITCH

This switch (8) is used to operate control panel B (multi-information) or to stop the alarm buzzer.

When the switch is released, it returns automatically to the center position.



- **When display panel B (multi-information) is in operation mode**
  - When the alarm buzzer is sounding, turn this switch to the left or right to stop the buzzer.
  - If the switch is held at the (a) position for at least 2.5 seconds, the display switches to the maintenance mode.

- **When display panel B (multi-information) is in the maintenance mode**

  ■ position: Cancel or reset to operation mode

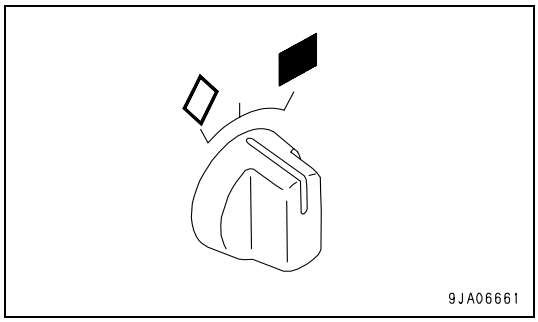
  ◇ position: Confirms selection or selected item

  For details, see “METHOD OF USING MAINTENANCE MODE (3-24)“.

METHOD OF USING MAINTENANCE MODE

To switch from the operation mode to the maintenance mode, turn the buzzer switch to the ■ position and hold it there for at least 2.5 seconds. The screen will switch to the maintenance mode.

On the first screen, the oil and filter maintenance mode is displayed.

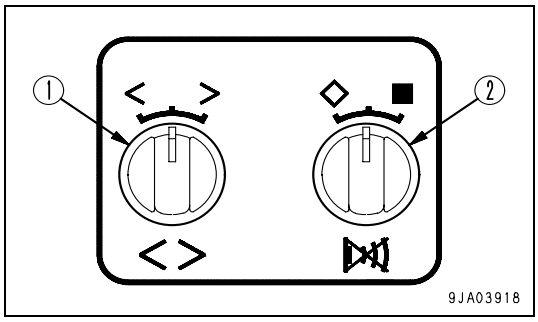


EXPLANATION OF MODES AND OPERATION

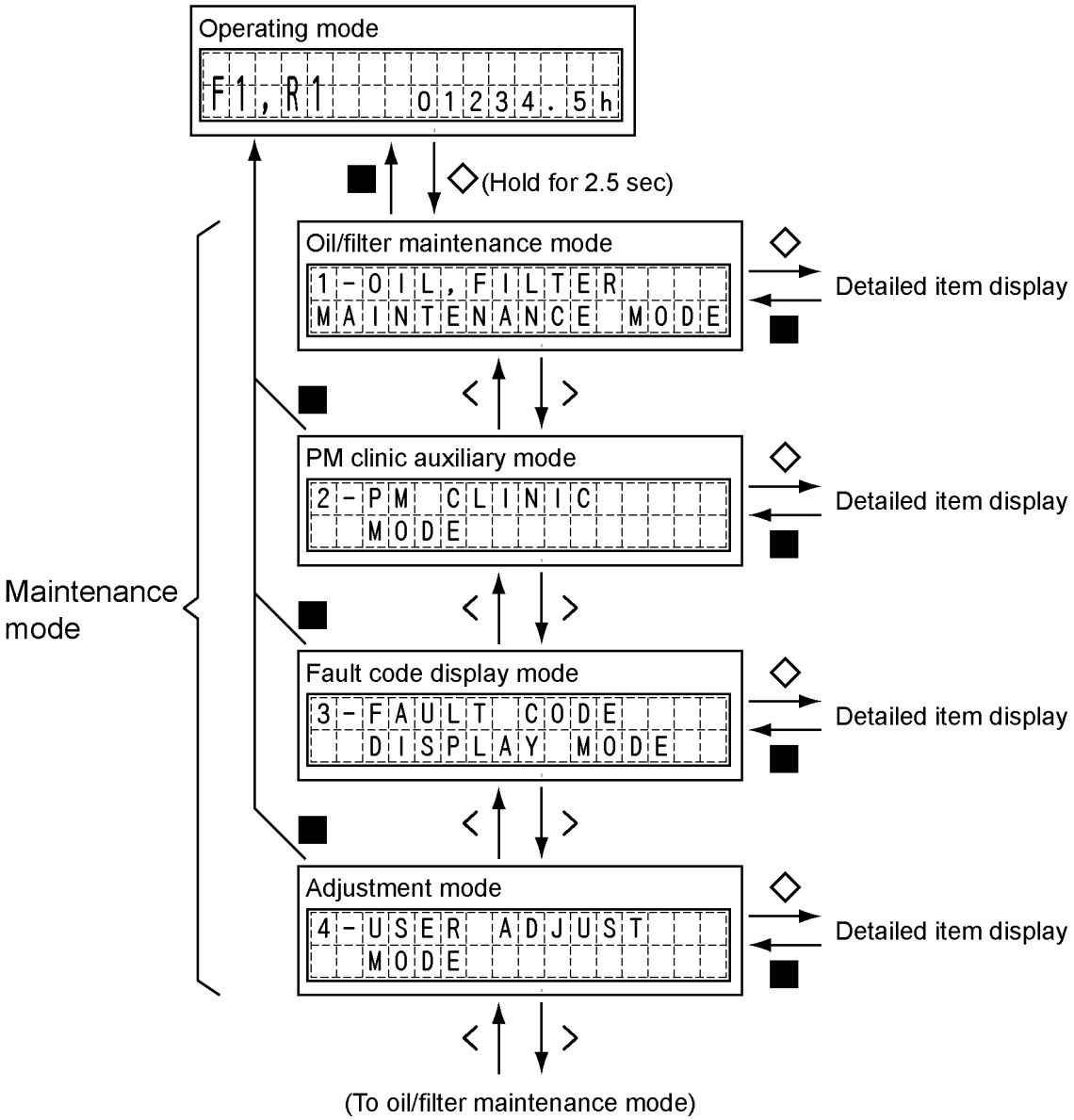
The maintenance mode has the following 4 sub modes.

Sub mode	Function	Reference items
Oil/filter maintenance mode	Oil or filter replacement time is displayed	METHOD OF USING OIL AND FILTER MAINTENANCE MODE (3-26)
PM clinic auxiliary mode	Engine speed or hydraulic circuit pressure is displayed	METHOD OF USING PM CLINIC AUXILIARY MODE (3-28)
Fault code display mode	Fault codes for electronic control related parts are displayed	METHOD OF USING FAULT CODE DISPLAY MODE (3-29)
Adjustment mode	Adjusts monitor brightness, etc.	METHOD OF USING USER ADJUST MODE (3-30)

Use information switch (1) and buzzer cancel switch (2) to operate each mode.



METHOD OF SELECTING EACH MODE



METHOD OF USING OIL AND FILTER MAINTENANCE MODE

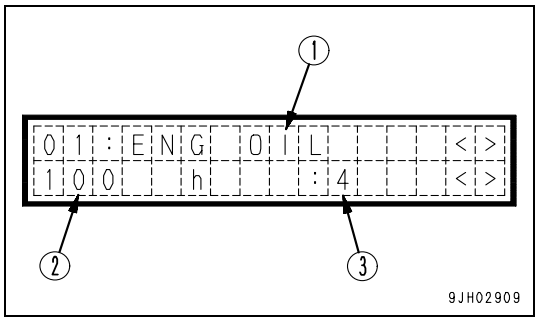
NOTICE
This function is only a guideline. If dirty oil or filters are found during daily maintenance, replace them immediately.
If the controllers or monitor panel are replaced, the timer for this function will not work properly. Contact your Komatsu distributor for replacement.

In the oil and filter maintenance mode, the replacement intervals for oil and filters are displayed on display panel B (multi-information).

(1) The item is displayed.

(2) The time remaining until replacement is displayed.

(3) The quantity of replacements until now is displayed.



The display items can be displayed in order by operating the information switch to the left or right (<, >).

Code	Display	Item	Replacement interval	
			1st time (cannot be changed)	2nd and following times (can be changed)
01	ENG OIL	Engine oil	500h	500h
02	ENG FILT	Engine oil filter	500h	500h
03	FUEL FILT	Fuel filter	500h	500h
04	HYD FILT	Hydraulic oil filter	500h	2000h
05	CORR RES	Corrosion resistor	500h	500h
06	BYPS FILT	Bypass filter (*)	-	-
07	DAMP OIL	Damper oil	500h	2000h
08	FNL OIL	Final drive oil	500h	1000h
09	HYD OIL	Hydraulic oil	500h	2000h
10	POWL OIL	Power train oil	500h	1000h
11	POWL FILT	Power train oil filter	500h	500h
12	HSS FILT	HSS charge filter (*)	-	-

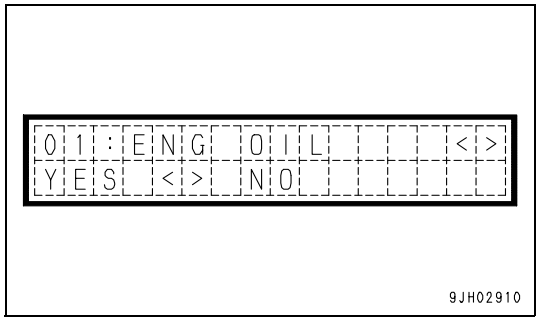
- The timing of the 1st interval cannot be changed. If some special condition makes it desirable to change the 1st interval, use the maintenance mode in the operator mode to change the replacement interval as follows. First, set so that the system thinks that the 1st maintenance has been completed, then set the 2nd and following times.
- (*) Although the marked item is displayed, it is not used with this machine.

When the oil or filter has been replaced, select the applicable item, then operate the buzzer cancel switch to ◇.

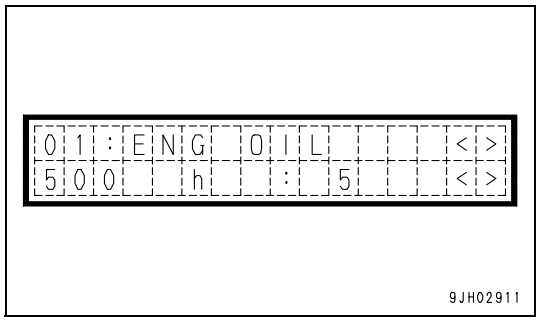
The screen will ask if you want to display the replacement history.

Operate the information switch to select YES, then operate the buzzer cancel switch to ◇. The replacement quantity will increase by 1, the replacement interval will be reset, and the oil, filter change interval lamp will go out.

When this is done, if the maintenance caution lamp does not go out, there is another item close to the replacement time, so check that item.



REMARK
To return to the maintenance mode, operate the buzzer cancel switch to ■.



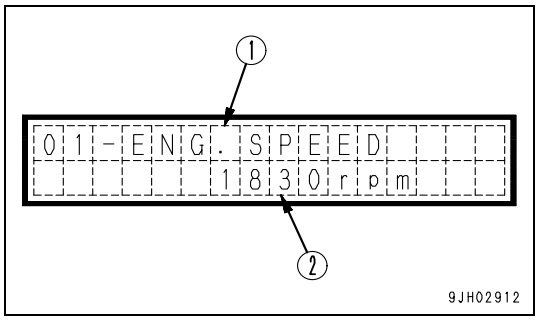
METHOD OF USING PM CLINIC AUXILIARY MODE

⚠ CAUTION

When moving the work equipment or setting the transmission to the travel position for carrying out measurements, check carefully that the situation is safe.

The PM clinic auxiliary mode displays the engine speed on display panel B (multi-information).

Display panel B (Malti-information) displays the item on the top line (1) and the measured value on the bottom line (2).



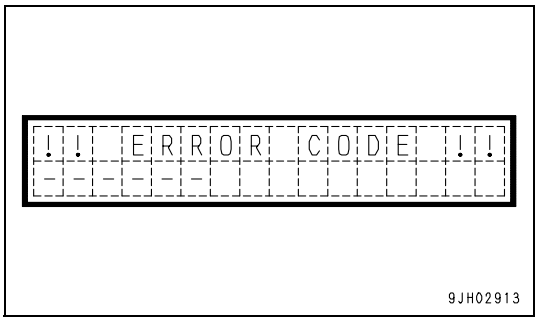
REMARK
Items such as the engine speed fluctuate and are difficult to see during the measurement. In such cases, operate the buzzer cancel switch to ◇. This makes it possible to hold the display of the value.
To cancel this mode, operate the buzzer cancel switch again to ◇.
To return to the maintenance mode, operate the buzzer cancel switch to ■.

METHOD OF USING FAULT CODE DISPLAY MODE

NOTICE
The fault items observed by this function are connected with the electronic control, so even if a fault code is not displayed, there is probably some problem with the machine. If the operator feels any problem with the machine, the machine should be stopped immediately and checked.

When any disconnection or short circuit in any sensor is detected, the location and fault code are displayed by a 6-digit code on display panel B (multi-information). When contacting your Komatsu distributor, inform your distributor of the code at the same time.

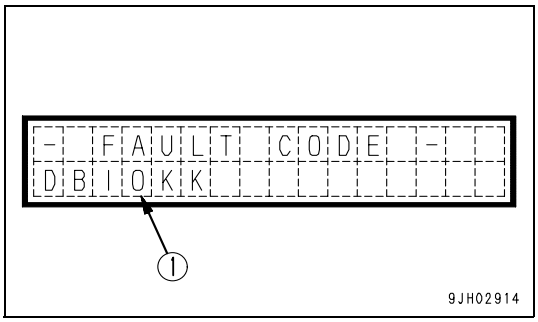
If the failure observation function has not determined the condition of the machine, the display is as shown in the diagram on the right.



With this function, existing failures can be displayed up to a maximum of 20 items.

If multiple failures are occurring, the display automatically changes every 2 seconds, so check the code (1).

The display is shown repeatedly.



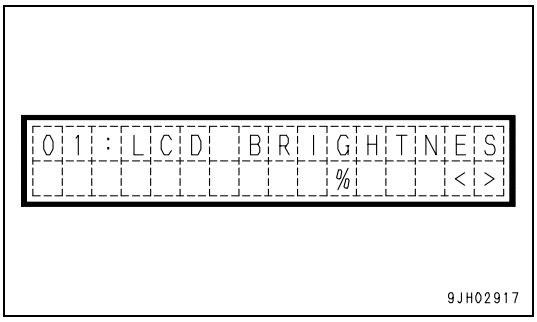
REMARK
To return to the maintenance mode, operate the buzzer cancel switch to ■.

METHOD OF USING USER ADJUST MODE

With the user adjust mode, the brightness of the panel screen backlighting and the contrast of the liquid crystal panel can be changed.

1. Adjusting backlighting of liquid crystal display
2. The diagram on the right is the mode for adjusting the brightness of the backlighting of the liquid crystal panel.

   This display will be switched to the screen brightness adjustment display, if the alarm buzzer cancellation switch is turned to the ◇ position.

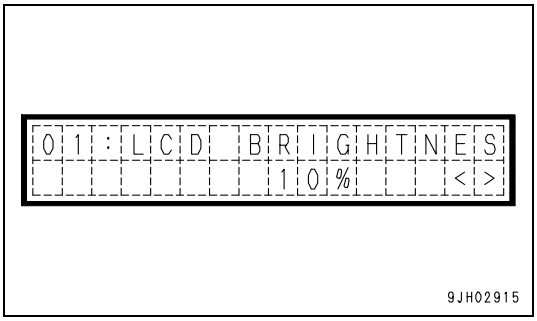


3. The brightness can be adjusted by operating the information switch.

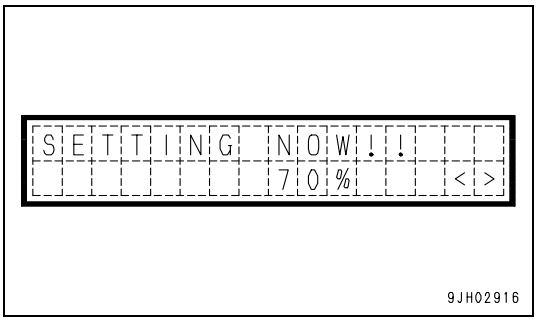
   The higher the number, the brighter the screen becomes; the lower the number, the darker the screen becomes.

   > position: Number increases

   < position: Number decreases



4. The brightness of the backlight for the LCD gauges may be held constant by turning the alarm buzzer cancellation switch to the ◇ position.



REMARK

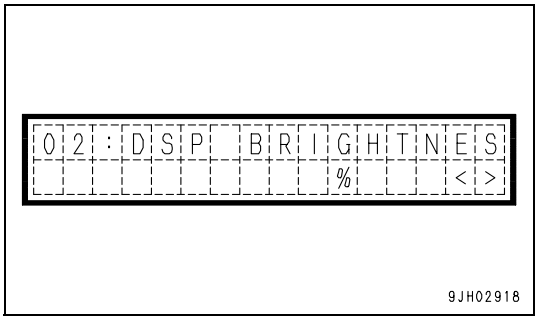
To return to the maintenance mode, operate the buzzer cancel switch to ■.

The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lit or not. Entering this mode when the front lamps are lit makes it possible to adjust the brightness when the front lamps are lit. In the same way, entering this mode when the front lamps are not lit makes it possible to adjust the brightness when the front lamps are not lit.

5. Adjusting backlighting of display panel B (multi-information)

6. The diagram on the right is the mode for adjusting the brightness of the backlighting of the display panel B (multi-information).

   On the screen, operate the buzzer cancel switch to ◇ to switch to the screen for adjusting the brightness.



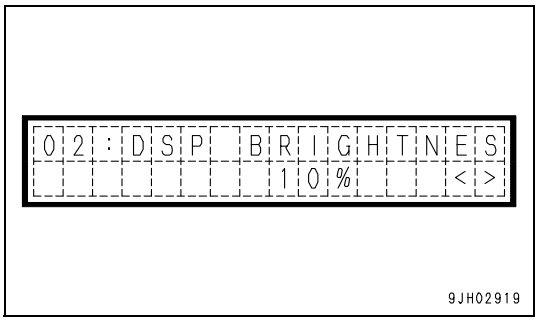
9JH02918

7. The brightness can be adjusted by operating the information switch.

   The higher the number, the brighter the screen becomes; the lower the number, the darker the screen becomes.

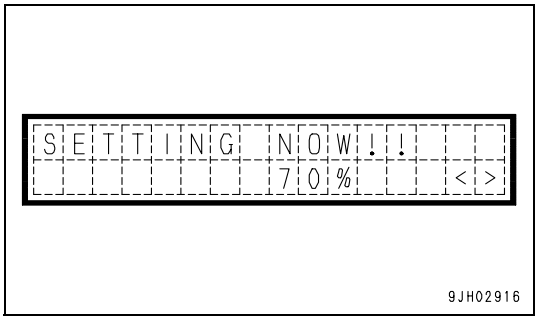
   > position: Number increases

   < position: Number decreases



9JH02919

8. When the buzzer cancel switch is operated to ◇, the brightness of the display panel B (multi-information) backlighting is set.



9JH02916

REMARK

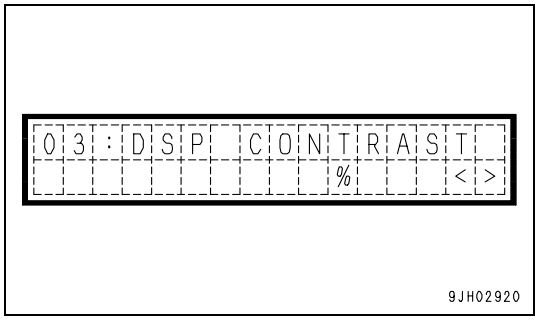
To return to the maintenance mode, operate the buzzer cancel switch to ■.

The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lit or not. Entering this mode when the front lamps are lit makes it possible to adjust the brightness when the front lamps are lit. In the same way, entering this mode when the front lamps are not lit makes it possible to adjust the brightness when the front lamps are not lit.

9. Adjusting contrast of liquid crystal display panel B (multi-information)

10. The diagram on the right is the mode for adjusting the contrast of the liquid crystal display panel B (multi-information).

    On this screen, operate the buzzer cancel switch to ◇ to switch to the screen to adjust the contrast.

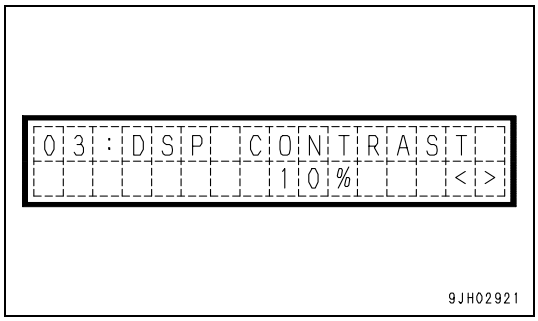


11. The contrast can be adjusted by operating the information switch.

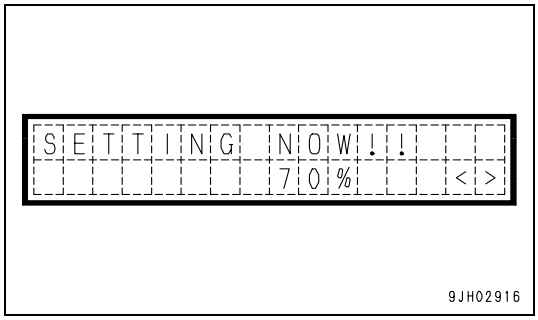
    The higher the number, the deeper the screen becomes; the lower the number, the lighter the screen becomes.

    > position: Number increases

    < position: Number decreases



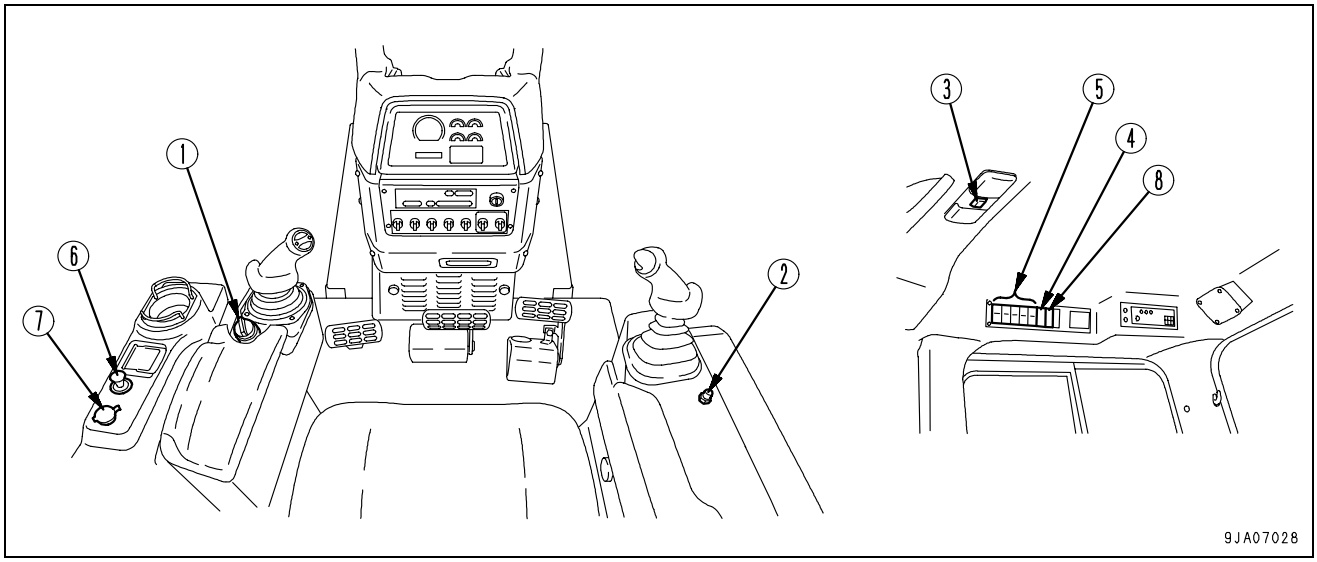
12. When the buzzer cancel switch is operated to ◇, the contrast of the liquid crystal display panel B (multi-information) is set.



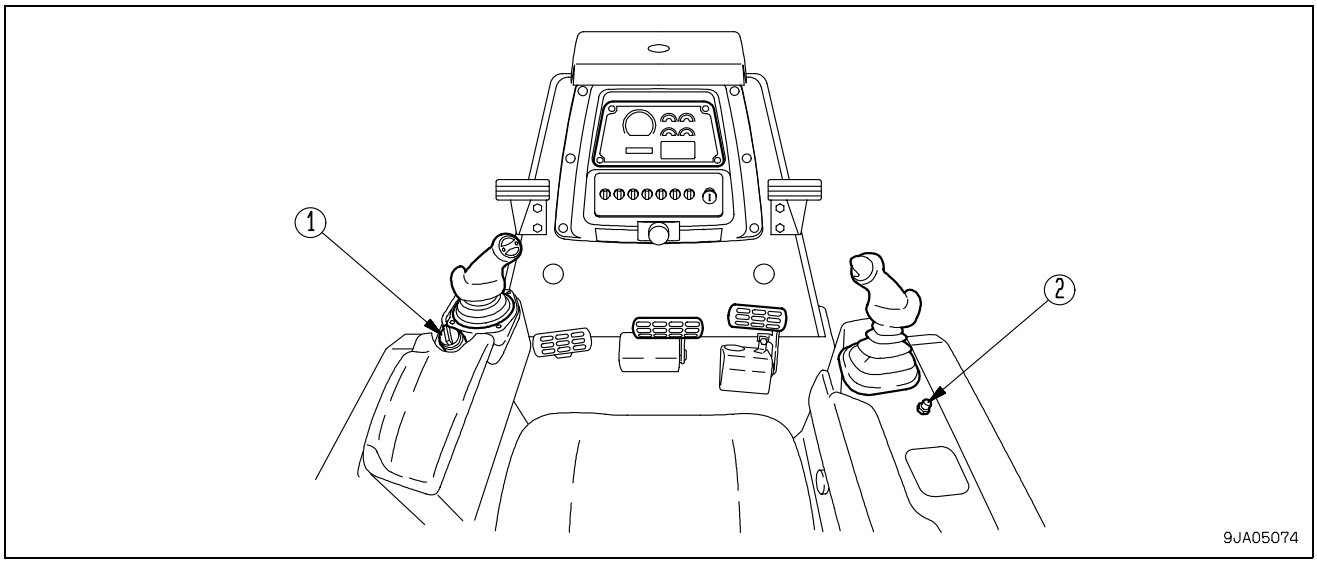
REMARK
To return to the maintenance mode, operate the buzzer cancel switch to ■.

SWITCHES

Machine equipped with cab



Machine equipped with canopy



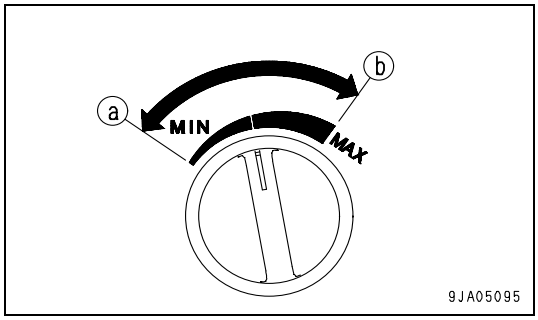
(1) Fuel control dial
(2) Horn switch
(3) Room lamp switch
(4) Additional working lamp switch (if equipped)
(5) Wiper switch
(6) Cigarette lighter
(7) Accessory socket
(8) Rear glass heating switch (if equipped)

FUEL CONTROL DIAL

Dial (1) is used to control the engine speed and output.

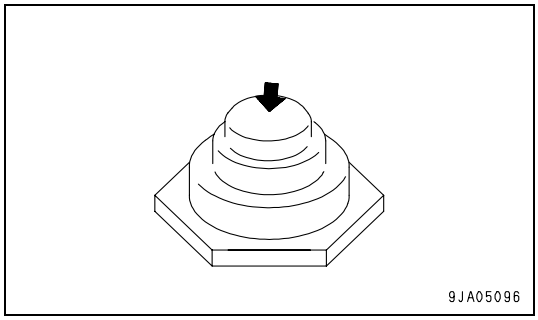
(a) Low idling position: Turn fully to the left

(b) High idling position: Turn fully to the right



HORN SWITCH

The horn sounds when the button (2) at the rear of the blade control lever at the right side of the operator's seat is pressed.

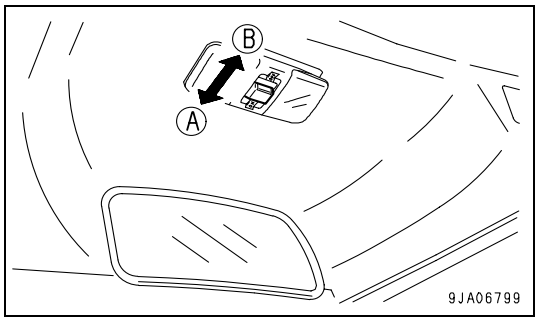


ROOM LAMP SWITCH

This (3) illuminates the room lamp.

(A) ON position: Lamps light up

(B) OFF position: Lamps are out



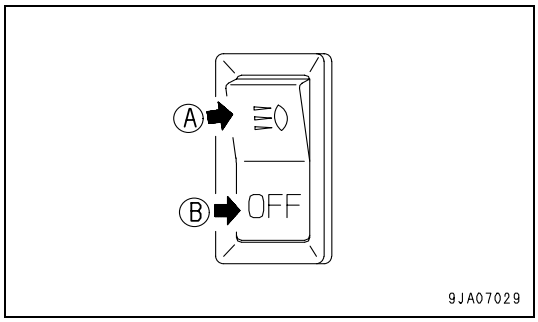
ADDITIONAL WORKING LAMP SWITCH

(Machine equipped with cab) (If equipped)

This switch (4) lights up the additional working lamps.

(A) ON position: Lamps light up

(B) OFF position: Lamps are out



WIPER SWITCH

This switch (5) activates the wipers.

The wiper switches are as follows.

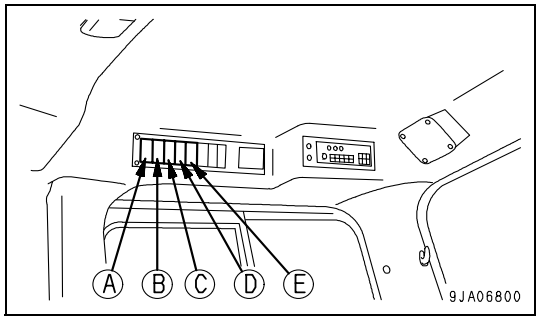
(A): Left door (LH)

(B): Front window (FF)

(C): Right door (RH)

(D): Rear window (RR)

(E): Wiper intermittent operation switch (INT)



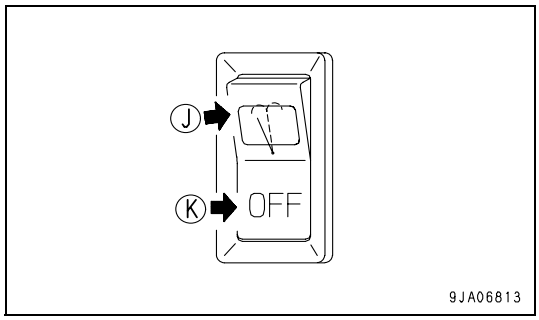
This is also used as the window washer switch.

The switch is operated as follows.

- Wiper only

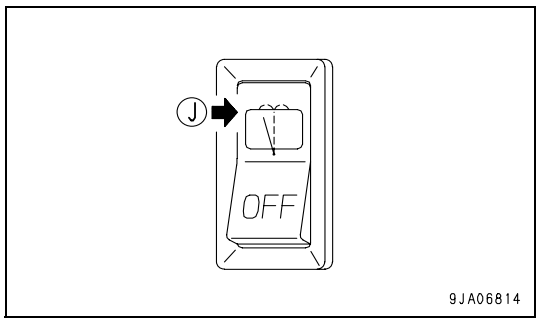
  (J) ON position: Wiper is operated

  (K) OFF position: Wiper stops



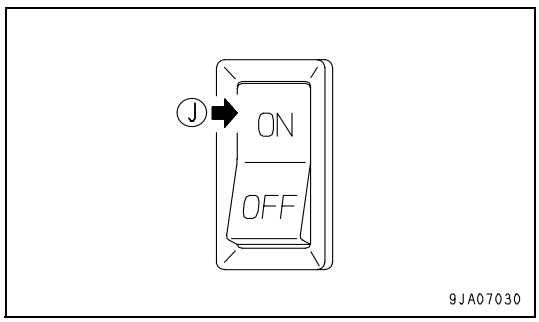
- Wiper and window washer

  If this is kept pressed to the ON position (J) while the wiper is working, water will be sprayed out.



REMARK

When the wiper intermittent operation switch is ON position (J), if the wiper switch for each window is turned ON position (J), the wiper will move intermittently.

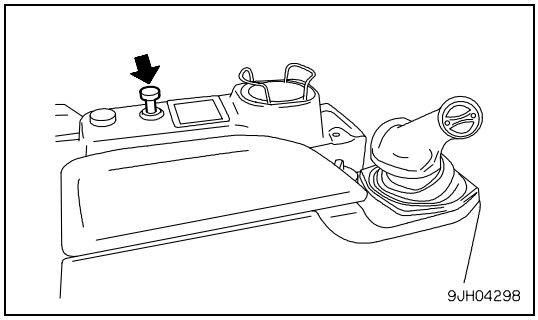


CIGARETTE LIGHTER

This lighter (6) is used to light cigarettes.

When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette.

If the cigarette lighter is removed, the socket can be used as a power source.

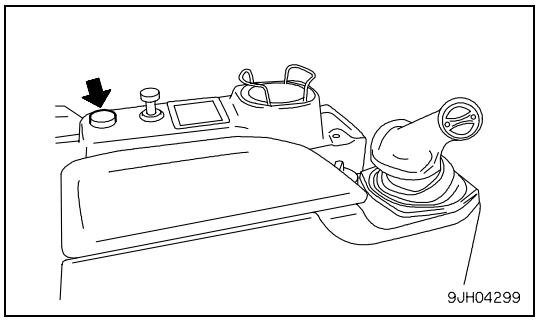


NOTICE
This cigarette lighter is 24V. Do not use it as the power source for 12V equipment. If it is used so, the equipment may fail.
The capacity of the cigarette lighter is 120W (24V x 5A).

ACCESSORY SOCKET

This (7) is used as the power source for a wireless or other 12V equipment.

Accessory socket capacity: 60W (12V x 5A)



REAR GLASS HEATING SWITCH

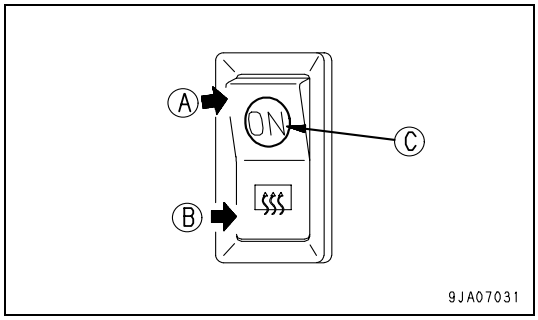
(If equipped)

This switch (8) is used to actuate the rear glass heater wire defroster in order to remove the mist from the glass.

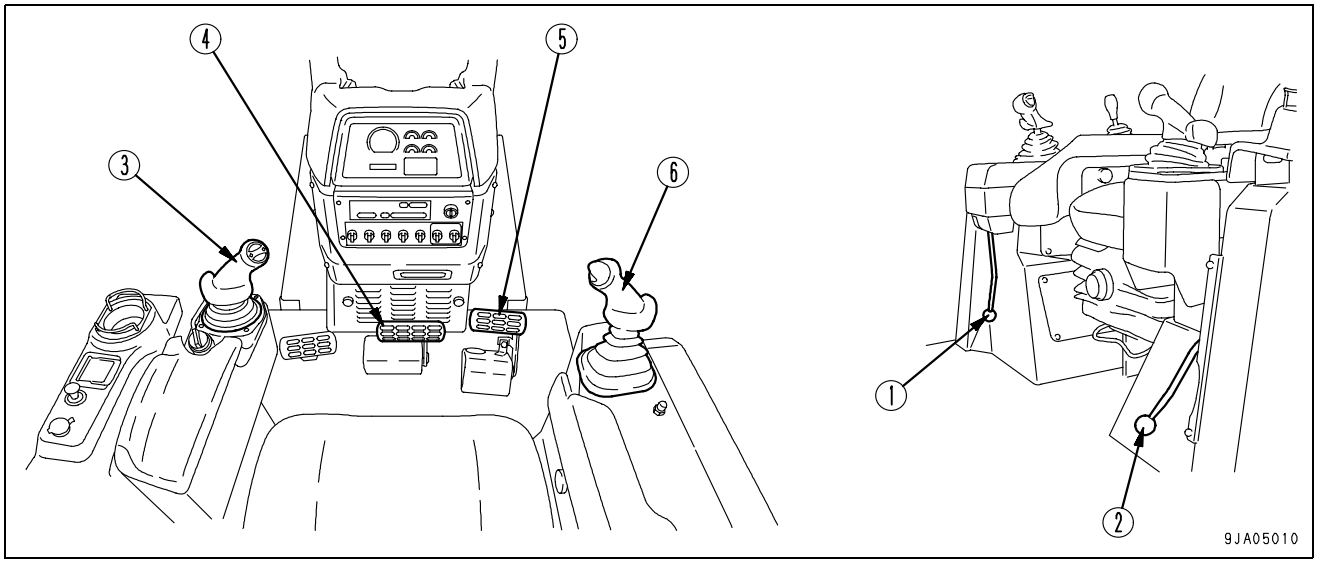
ON position (A): Actuated

At the same time, indicator (C) lights up.

OFF position (B): Stopped



CONTROL LEVERS AND PEDALS



(1) Work equipment lock lever
(2) Parking brake lever
(3) Steering, forward-reverse, gear shift lever
(4) Brake pedal
(5) Decelerator pedal
(6) Blade control lever

WORK EQUIPMENT LOCK LEVER

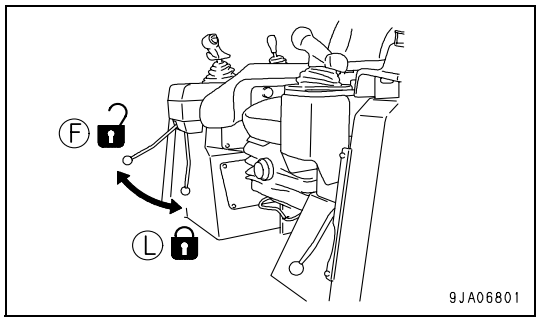
⚠ WARNING

- **When leaving the operator's compartment, set the work equipment lock lever securely to the LOCK position. If the work equipment lock lever is not at the LOCK position and the control levers are touched by mistake, it may lead to serious personal injury.**
- **If the work equipment lock lever is not set securely to the LOCK position, the work equipment may move and cause serious injury. Check that it is in the position shown in the diagram.**
- **When parking the machine or when carrying out maintenance, always lower the work equipment to the ground, then set the work equipment lock lever to the LOCK position.**

This lever (1) is a lock device for the work equipment control lever.

(L) LOCK position: Work equipment does not move even when work equipment control lever is operated

(F) FREE position: Work equipment moves according to operation of work equipment control lever



REMARK
When starting the engine, to ensure safety, always set the work equipment lock lever to the LOCK position.

PARKING BRAKE LEVER

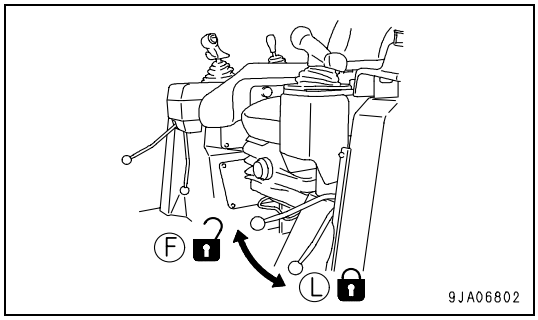
⚠ WARNING

- **When parking the machine, always set the parking brake lever in the LOCK position.**
- **If the parking brake lever is operated, the brake is applied, even when the machine is traveling. The machine will suddenly stop, so this is dangerous. For this reason, do not operate the parking brake lever when the machine is moving, except in emergencies.**

This lever (2) is the control lever for the parking brake.

(L) LOCK position: Parking brake is applied

(F) FREE position: Parking brake is released



REMARK
Before moving the parking brake lever to the LOCK position, return the steering, forward-reverse, gear shift lever to the NEUTRAL position.
When starting the engine, if the parking brake lever is not in the LOCK position, the limit switch is actuated and it is impossible to start the engine.

STEERING, FORWARD-REVERSE, GEAR SHIFT LEVER

This control lever (3) serves to change forward or reverse direction of machine travel, steer the machine to the right or left, change the traveling speed and make a counter-rotation.

- **Forward-reverse shifting**

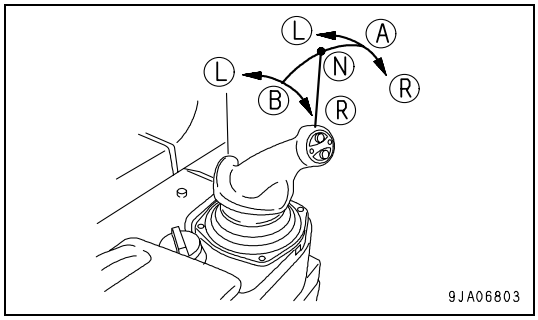
Position (A): FORWARD

Position (B): REVERSE

Position (N): NEUTRAL

Operate the lever to the front to travel FORWARD.

Operate the lever to the rear to travel in REVERSE.



- **Steering**

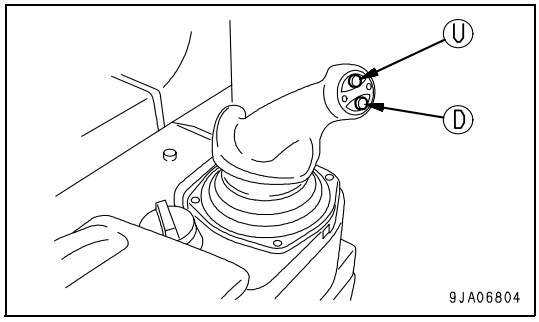
Position (L): Left turn

Position (R): Right turn

If the lever is set in the forward or reverse travel position and moved to the left or right, the machine will turn in the direction that the lever is moved. The turning radius changes according to the amount that the lever is moved. If the lever is moved fully to the left or right, the turning radius will become smaller.

REMARK
When moving the joystick lever, and the lever is released, it will return to (A) or (B) and the machine will travel in a straight line.

- **Gear shifting**



When UP switch (U) or DOWN switch (D) is pushed, the transmission speed will change.

UP switch (U): Each time the switch is pressed, the transmission will up shift one speed.

DOWN switch (D): Each time the switch is pressed, the transmission will down shift one speed.

There are 3 forward and 3 reverse speed ranges.

For details of the maximum speed in each speed range, see “SPECIFICATIONS (5-2)“.

REMARK
The speed range being used is displayed on panel A on the monitor panel according to the gearshift operation.
<Example>
Neutral: N is displayed on the display panel.
FORWARD 2nd: F2 is displayed on the display panel.
REVERSE 3rd: R3 is displayed on the display panel.
When the parking brake lever is locked, P is displayed.
For details of the method of shifting gears according to the shift mode, see the “SHIFTING GEARS (3-101)“. Shift mode selection means that the selected speed range is displayed at the NEUTRAL position (N) before starting.

- **Operating counterrotation turn**

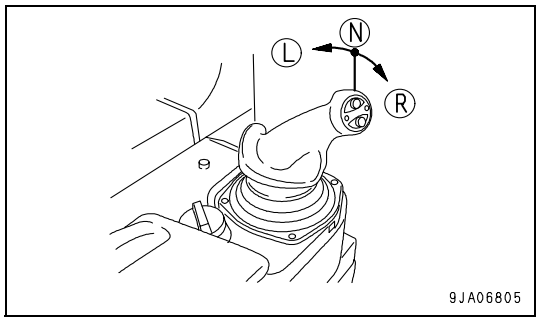
⚠ WARNING

When operating the counterrotation turn, if the load on the left and right is not balanced, the machine may make a pivot turn, so check the ground conditions and be careful not to hit any obstacles when carrying out the operation.

With the lever at the NEUTRAL position (N), move the lever partially in the direction of turn. The left and right tracks will rotate in opposite directions, and the machine will make a slow counterrotation turn. If the lever is operated further, the speed of the counterrotation turn will increase.

(R): Right counterrotation turn

(L): Left counterrotation turn

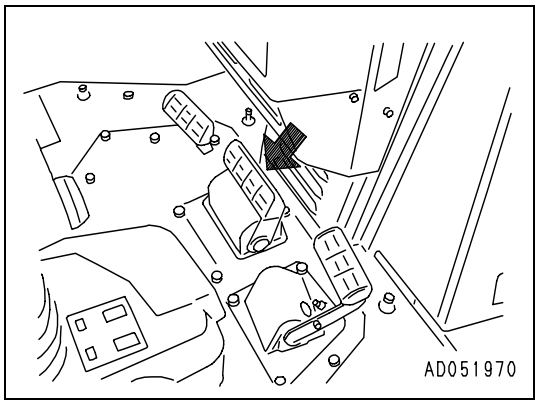


BRAKE PEDAL

⚠ WARNING

Do not place your foot on this pedal unnecessarily.

Depress the pedal (4) to apply the right and left brakes.



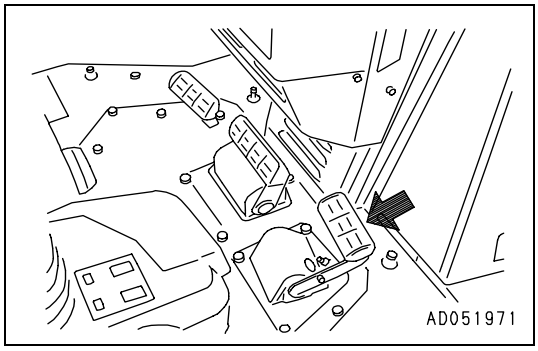
DECELERATOR PEDAL

⚠ WARNING

- **Do not place your foot on this pedal unnecessarily.**
- **When passing over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, so there is danger that the travel speed will also increase suddenly. To prevent this, depress the decelerator pedal to reduce the travel speed.**

This pedal (5) is used when reducing the engine speed or stopping the machine.

When switching between forward and reverse, or when stopping the machine, use this pedal to reduce speed.



BLADE CONTROL LEVER

POWER ANGLE, POWER TILTDOZER

This lever (6) is used to lift, tilt or angle the blade.

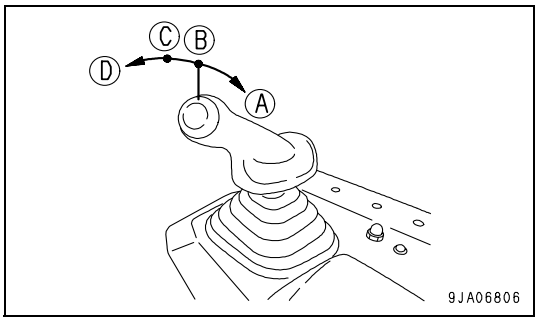
- Lifting control

(A) RAISE: Blade goes up

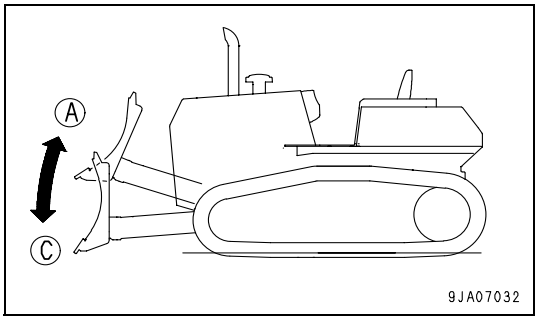
(B) HOLD: Blade is stopped and held in this position.

(C) LOWER: Blade goes down

(D) FLOAT: Blade will move freely according to external force.



REMARK
When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.
If the engine is stopped when the lever is at the FLOAT position, the control lever will automatically return to the HOLD position.
Before starting the engine, check that the blade control lever is at the HOLD position.
In cold weather, it will take time for the lever to be held at the HOLD position, so hold the lever by hand at the HOLD position for at least 1 second.

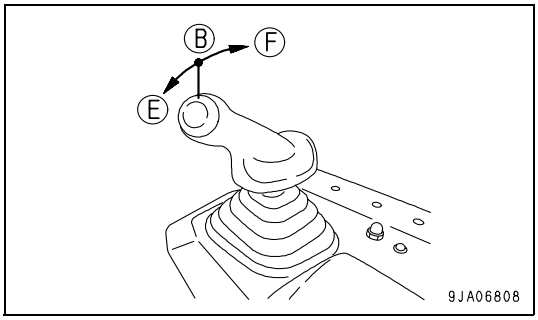


- Tilting control

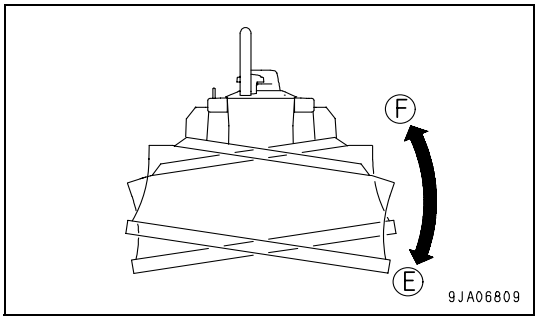
(B) HOLD: Blade is stopped and held in this position.

(E) LEFT TILT

(F) RIGHT TILT



Condition of blade	Amount of tilt		
	STD blade		Wide blade
	D61PX	D61EX	D61EX
Right tilt	600 mm (23.6 in)	510 mm (20.1 in)	600 mm (23.6 in)
Left tilt	600 mm (23.6 in)	510 mm (20.1 in)	600 mm (23.6 in)



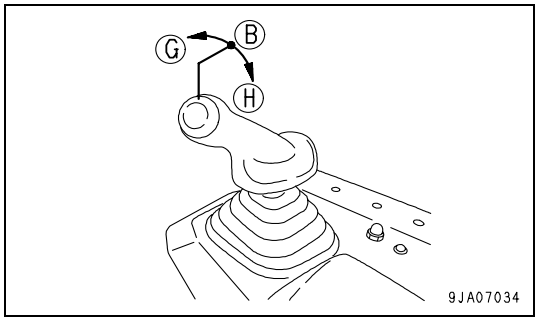
- Angling control

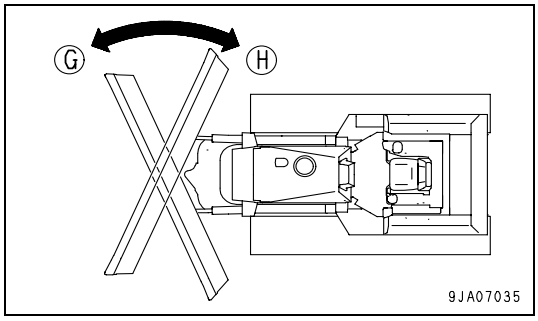
Turn the knob to the right or left to angle the blade.

(G) LEFT ANGLE

(B) HOLD: Blade is stopped and held in this position.

(H) RIGHT ANGLE





REMARK
When performing only angling operation, be sure to set the lever in the HOLD position and turn the knob to the right or left. If the angling operation is performed while the lever is not in the HOLD position (while either or both of lifting and tilting operations are performed), all of those operations can be continued, but the moving speed of the blade is lowered. Select the operations according to the type of the work.
If the lifting or tilting operation is performed while angling operation is performed, the machine moves similarly to the above.

POWER TILTDOZER

This lever (6) is used to lift or tilt the blade.

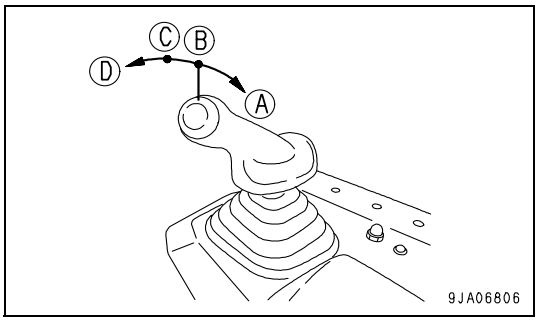
- Lifting control

(A) RAISE: Blade goes up

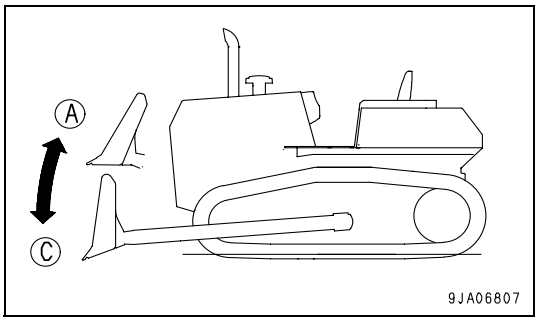
(B) HOLD: Blade is stopped and held in this position.

(C) LOWER: Blade goes down

(D) FLOAT: Blade will move freely according to external force.



REMARK
When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.
If the engine is stopped when the lever is at the FLOAT position, the control lever will automatically return to the HOLD position.
Before starting the engine, check that the blade control lever is at the HOLD position.
In cold weather, it will take time for the lever to be held at the HOLD position, so hold the lever by hand at the HOLD position for at least 1 second.

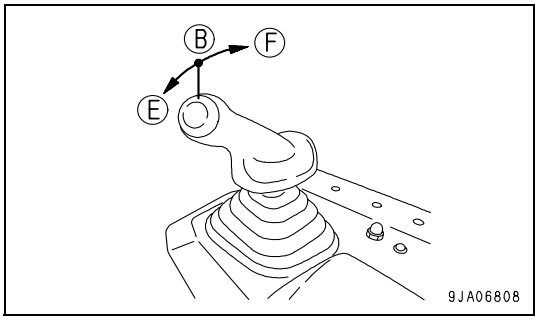


- Tilting control

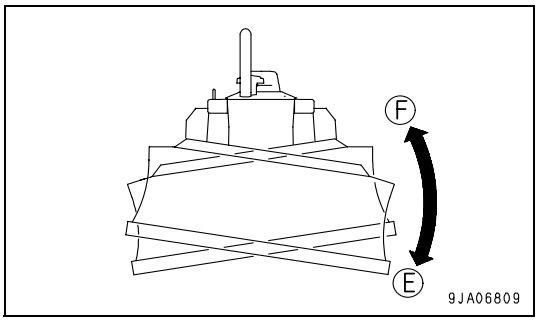
(B) HOLD: Blade is stopped and held in this position.

(E) LEFT TILT

(F) RIGHT TILT



Condition of blade	Tilting distance	
	D61PX	D61EX
Right tilt	440 mm (15.8 in)	500 mm (19.7 in)
Left tilt	420 mm (16.5 in)	440 mm (17.3 in)



CIRCUIT BREAKER

NOTICE

- **When resetting the circuit breaker, always turn off the power first (turn the starting switch OFF).**
- **If the reset button for the circuit breaker comes out immediately when it is pushed in, it is necessary to carry out an inspection of the electrical circuit.**

If the starting switch does not work when it is turned to the ON position, the circuit has probably been cut off by the circuit breaker.

Inspect the circuit breaker.

REMARK

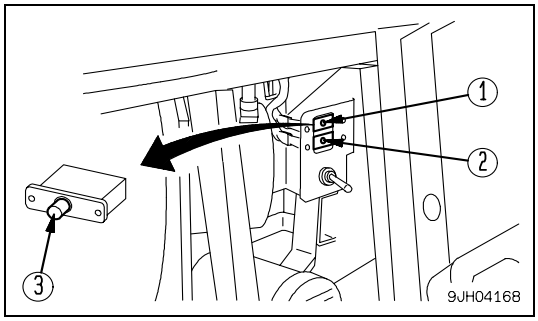
The circuit breaker is a device installed in electric circuits where a large current flows. It is installed to protect the electric circuit. It protects the electric components and wiring from damage caused by an abnormal current in the same way as a normal fuse. After repairing and restoring the location of the abnormality, there is no need to replace the breaker. It can be used again.

1. Open the cover at the bottom of the front panel. Circuit breakers (1) and (2) can be seen.

   (Circuit breaker (2) is installed only on machines equipped with an air conditioner.)

2. When the circuit breaker has cut off the circuit, reset button (3) springs out.

   Push reset button (3) in.



No	Fuse capacity	Circuit
(1)	20A	Starting switch
(2)	20A	Air conditioner

FUSE

NOTICE
Before replacing a fuse, be sure to turn starting switch to the OFF position.

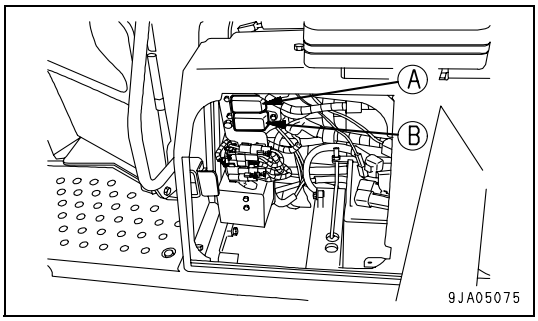
The fuses protect the electrical equipment and wiring from burning out.

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.

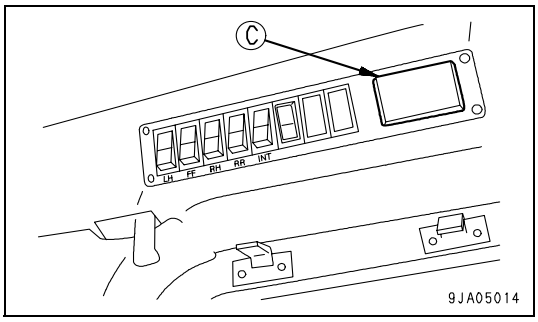
- Chassis

Fuse boxes (A) and (B) are installed under the battery cover.



- Cab (machines equipped with cab)

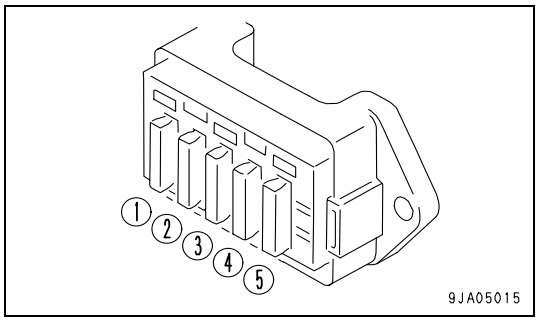
Fuse box (C) is installed in the overhead panel.



FUSE CAPACITY AND CIRCUIT NAME

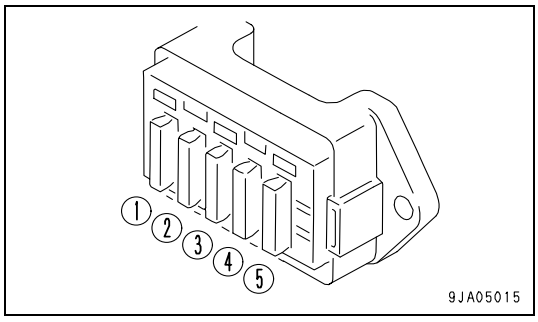
Fuse box (A)

NO.	Fuse capacity	Circuit
(1)	20A	Reserve
(2)	15A	Horn, Heater relay Air suspension seat (OPT)
(3)	20A	Front lamp, Rear lamp
(4)	20A	Controller
(5)	10A	Continuous power source



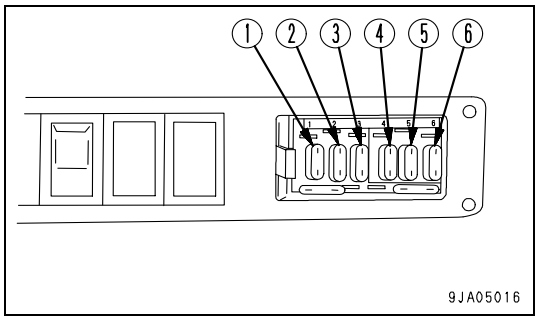
Fuse box (B)

NO.	Fuse capacity	Circuit
(1)	15A	Monitor panel
(2)	10A	PPC lock S/W
(3)	30A	Air conditioner
(4)	10A	Backup alarm
(5)	30A	Body power source



Fuse box (C)

NO.	Fuse capacity	Circuit
(1)	10A	Radio memory
(2)	20A	Radio, lamp,cigarette lighter
(3)	20A	Heated glass (if equipped)
(4)	10A	Rear wiper
(5)	10A	Front wiper
(6)	10A	Left and right door wiper



FUSIBLE LINK

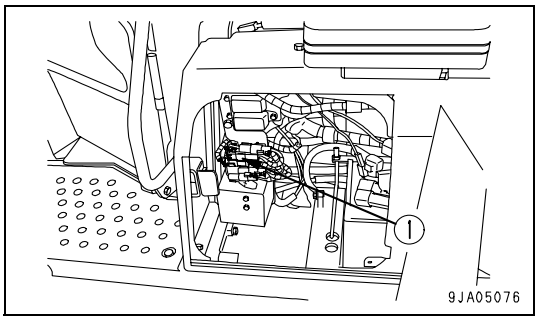
If the electrical equipment in the cab does not work or the battery is not charged, there is probably a disconnection in the fusible link assembled in the wiring harness, so carry out inspection and replace if necessary.

REMARK
A fusible link refers to the large-sized fuse wiring installed in the high current flow portion of the circuit to protect electrical components and wiring from burning, similar to an ordinary fuse.

- Fusible link (1)

Open the battery cover on the left side of the machine. Fusible link (1) can be seen.

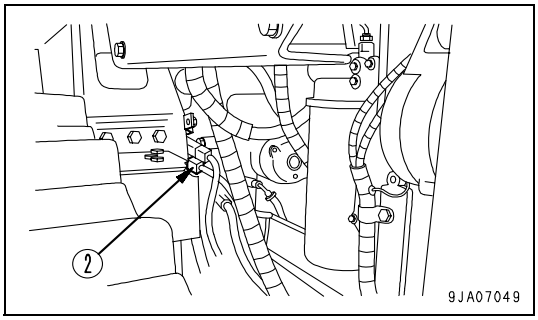
Capacity: 65 A



- Fusible link (2)

Open the engine side cover on the right side of the machine. Fusible link (2) is on the right side of the starting motor.

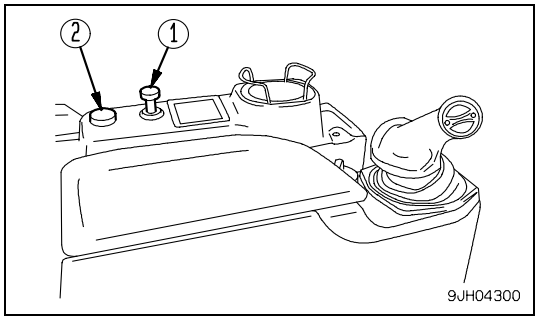
Capacity: 65 A



ELECTRIC POWER TAKE-OUT ADAPTER

MACHINE EQUIPPED WITH CAB

NOTICE
The power for the cigarette lighter is 24V. Do not use it as the power source for 12V equipment.



The cigarette lighter socket (1) can be used as a power source for 24V equipment and the accessory socket (2) can be used for 12V equipment.

Capacity of cigarette lighter : 120W (24V x 5A)

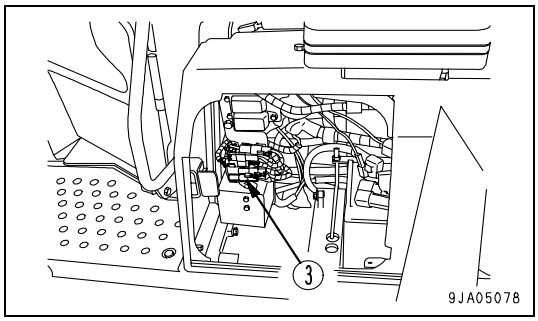
Capacity of accessory socket : 60W (12V x 5A)

MACHINE EQUIPPED WITH CANOPY

NOTICE
- **Do not use as a power supply for 12V equipment. This will cause failure of the equipment.**
- **When using as a power supply pickup, do not install equipment which exceeds 120W (24V x 5A).**

1. Open the battery cover on the left side of the machine body.
2. There is the connector for the spare power take-off.

   (Connector CN800 (3) can be used.)



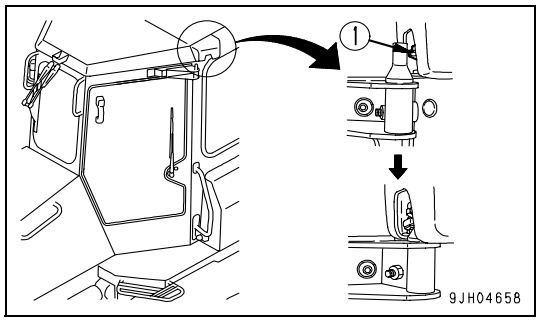
REMARK
Ground the negative wire to the body work or ROPS. Do not ground it to the rubber mounted engine or valves. This will cause failures.
If the wire is grounded to a point where there is still paint, the electricity will not flow smoothly, so remove the paint.

DOOR - OPEN LOCK

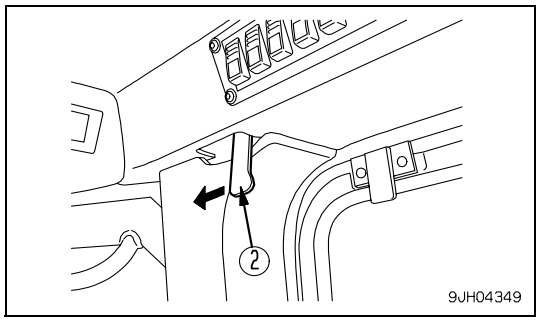
(Machines equipped with cab)

Use this when your want to keep the door held open.

1. Push the door against the door catch (1). The door will be held by the door catch.



2. To release the door, move lever (2) inside the cab to the front of the cab. This will release the catch.



NOTICE

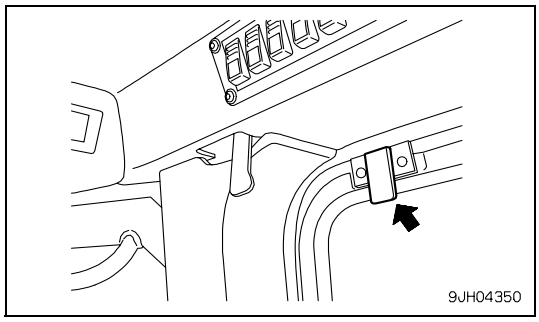
- **When keeping the door open, fix it securely to the catch.**
- **Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.**
- **Keep the door locked open securely. The door may swing closed because of the vibration.**

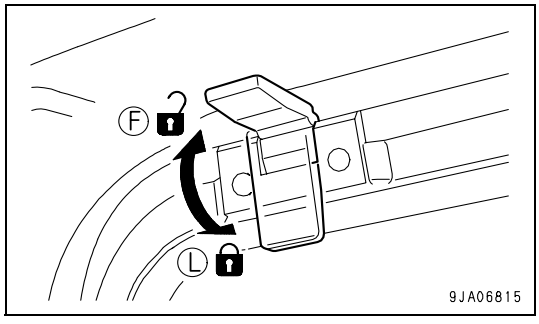
SASH GLASS INTERMEDIATE LOCK

(Machines equipped with cab)

When working with the cab sash glass open, use this lock to prevent the glass from chattering.

- When the lever is in the FREE position (F), the glass can be opened or closed.
- When the lever is in the LOCK position (L), the glass is held in position.



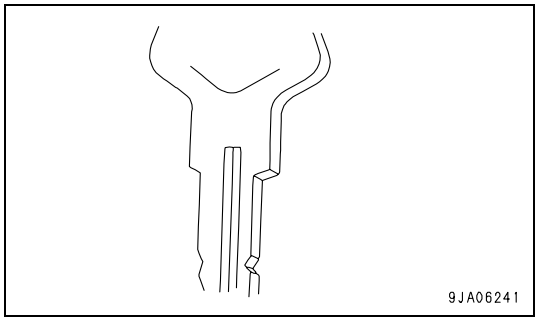


CAP, COVER WITH LOCK

Use the starting switch key to open and close the caps and covers.

For their locations , see “LOCKING (3-116)“.

Insert the key as far as it will go, then turn it. If the key is turned before it is inserted fully, it may break.



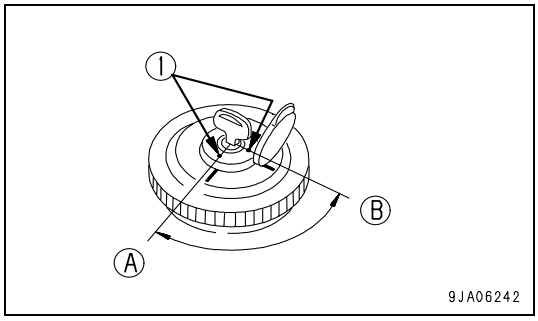
METHOD OF OPENING AND CLOSING CAP WITH LOCK

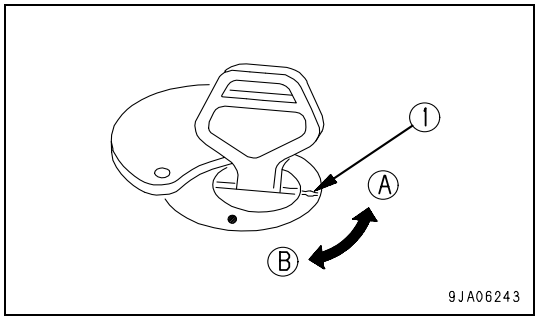
TO OPEN THE CAP

1. Insert the key into the key slot.
2. Turn the key clockwise, align the key groove with mark (1) on the cap, then open the cap.

   Position (A): OPEN

   Position (B): LOCK





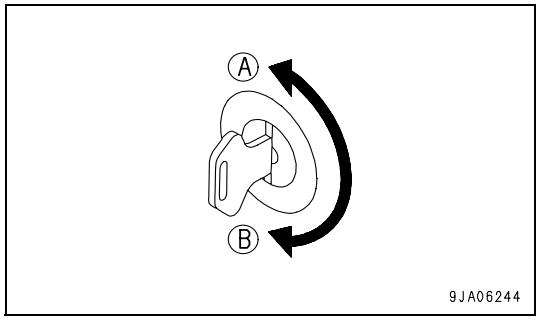
TO LOCK THE CAP

1. Turn the cap until tight, then insert the key into the key slot.
2. Turn the starting switch key to LOCK position (B), then remove the key.

METHOD OF OPENING AND CLOSING COVER WITH LOCK

TO OPEN THE COVER (LOCKED COVER)

1. Insert the key into the key slot.
2. Turn the key counterclockwise in direction (A), then pull the cover knob to open the cover.



TO LOCK THE COVER

1. Close the cover and insert the key into the key slot.
2. Turn the key clockwise and take the key out.

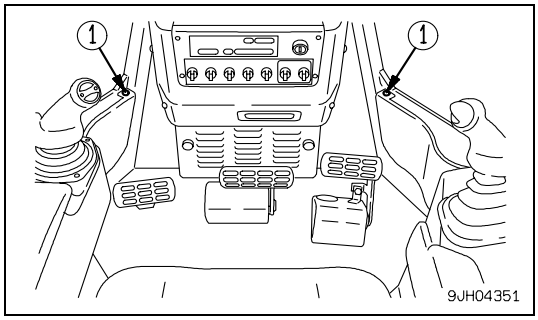
DOOR POCKET

(Machines equipped with cab)

This is inside the left and right doors. Use it for storing the Operation and Maintenance Manual or other things.

Do not put heavy tools or other heavy objects in it.

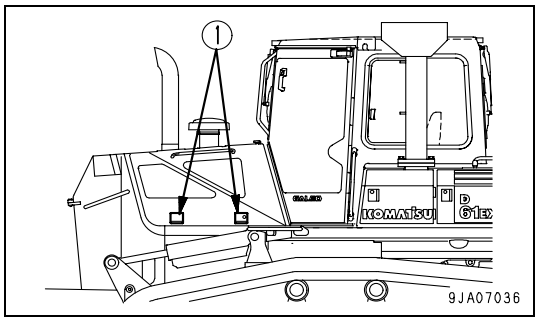
If the pocket is dirty, turn 4 clips (1), then remove the pocket and rinse it.



OPENING AND CLOSING ENGINE SIDE COVER

When opening

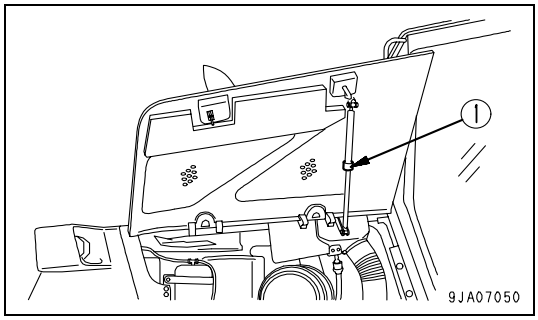
Pull door release lever (1) to release the lock, then pull the cover up.



When closing

NOTICE
When closing the cover, always release the gas damper lock first.
If the gas damper lock is not released and any attempt is made to close the cover, the gas damper may break.

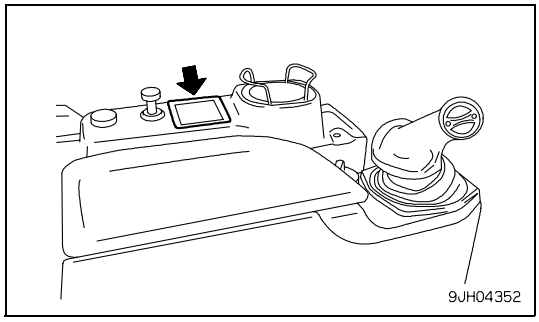
Push the orange button in the center of the gas damper (1) to release the lock, then push the cover down.



ASHTRAY

This is on the left side of the operator's seat.

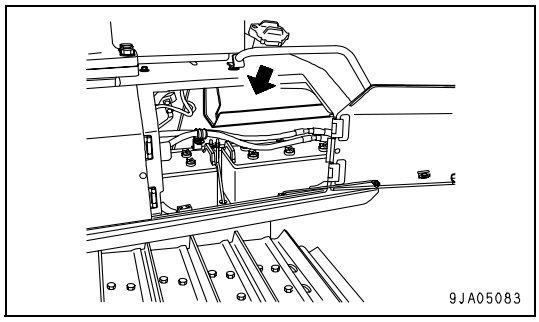
Always make sure that you extinguish the cigarette before closing the lid.



TOOL BOX

The tool box is inside the battery check cover at the rear left.

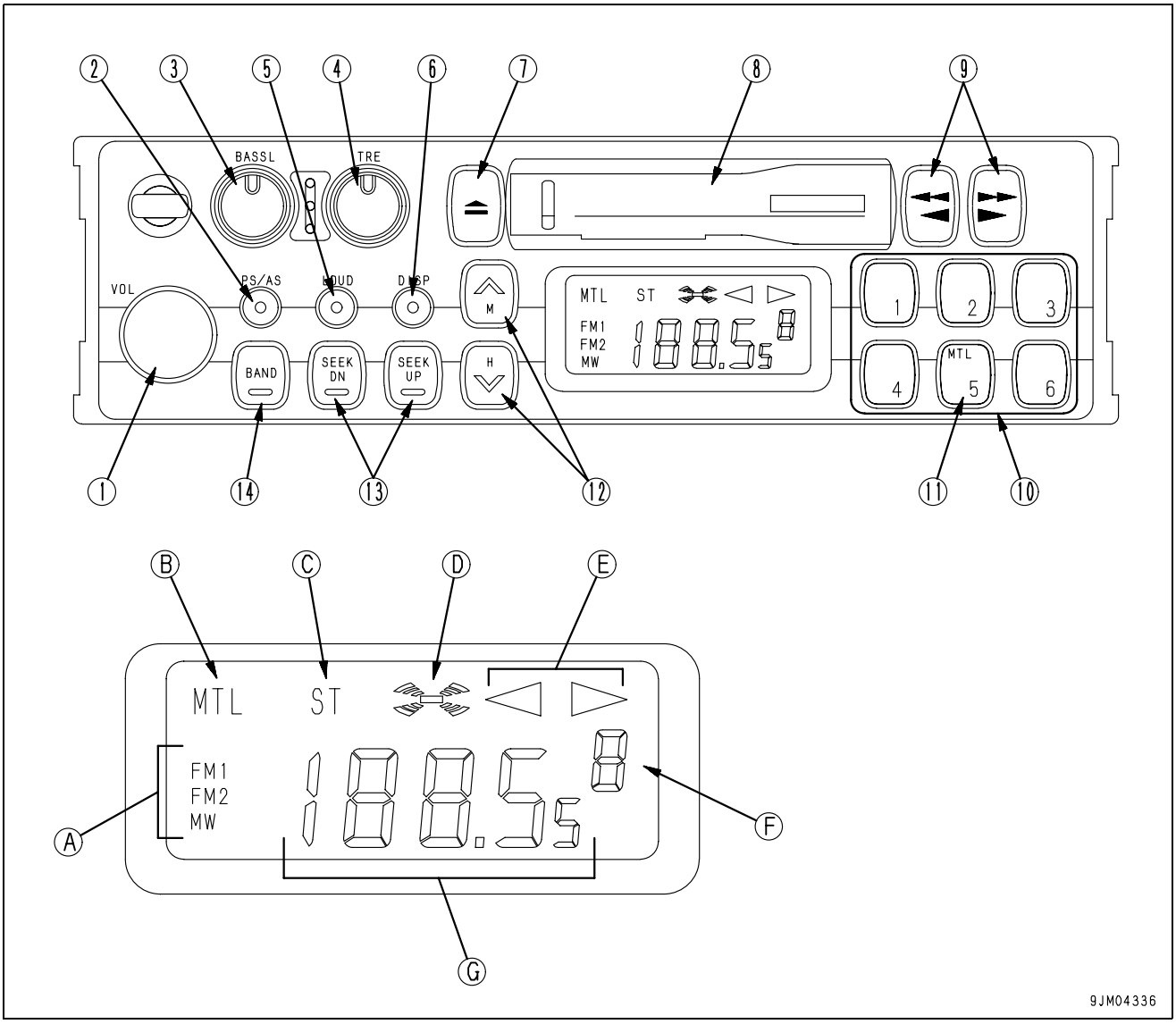
Keep the tools in this box.



CAR STEREO, HANDLING

(Machine equipped with cab) (If equipped)

EXPLANATION OF COMPONENTS



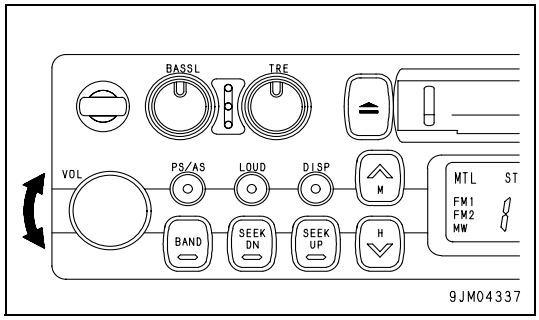
(1) Power switch/volume
(2) Auto-store/preset scan button
(3) Bass control knob
(4) Treble control knob
(5) Loudness button
(6) Time/radio display selector button
(7) Tape eject button
(8) Cassette door
(9) Fast-forward, rewind buttons
(10) Preset buttons
(11) Metal tape button
(12) Manual tuning buttons
(13) Seek tuning buttons
(14) Band selector 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

POWER SWITCH/VOLUME

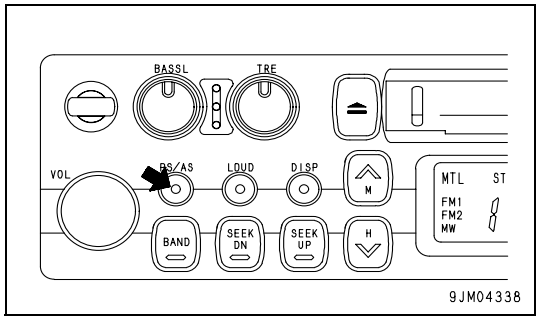
Turn this knob (1) to the right until it clicks to turn the power on.

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, this auto-store function automatically starts to search for the desired station within a receivable band, and memorize the frequency in the preset memory. During this scanning process, the frequency shown in the right side of display continues to change. This indicates that each frequency is memorized in the auto-store.

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.

- Preset scan

  If this button is pressed for less than 0.5 second while in radio reception, 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 No. 6 stations consecutively.

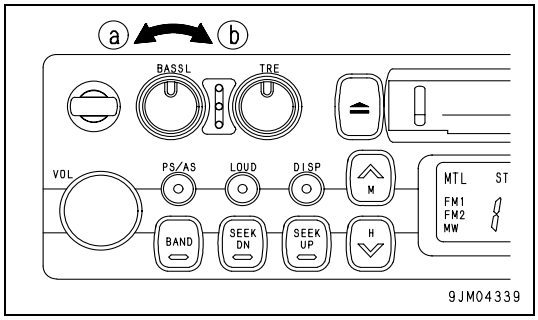
  When the desired station is found, press the button again. This stops the preset scan tuning process and switches to ordinary broadcasting. The same process will be repeated continuously until the button is pressed again.

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

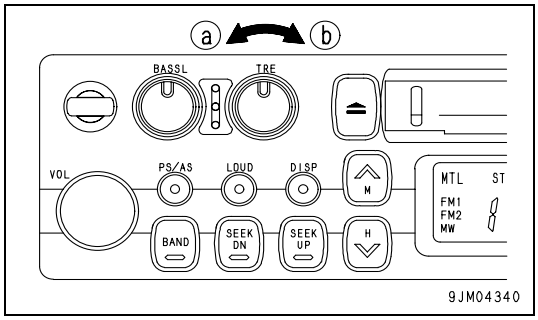


TREBLE CONTROL KNOB

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

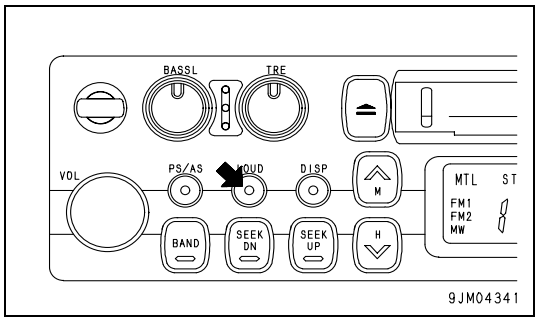


LOUDNESS BUTTON

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.

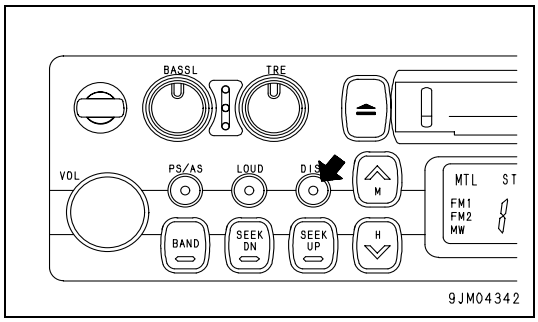
Push button: Actuated (ON)

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

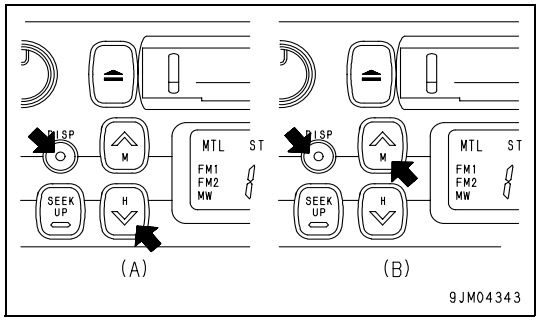
  Press the button to set the time display.

  (A) Correcting hour:

  Keep the DISP button pressed and press the bottom (H) of the TUNING button to correct the hour.

  (B) Correcting minute:

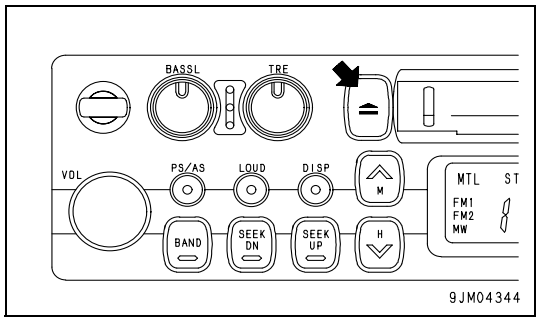
  Keep the DISP button pressed and press the top (M) of the TUNING button to correct the minute.



TAPE EJECT BUTTON

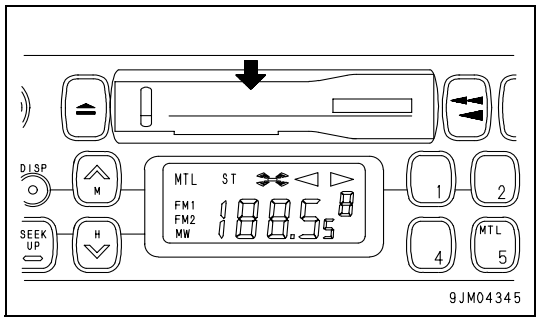
This button (7) is used to stop the tape and to eject the cassette.

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 through the cassette door (8).



FAST FORWARD, REWIND BUTTONS

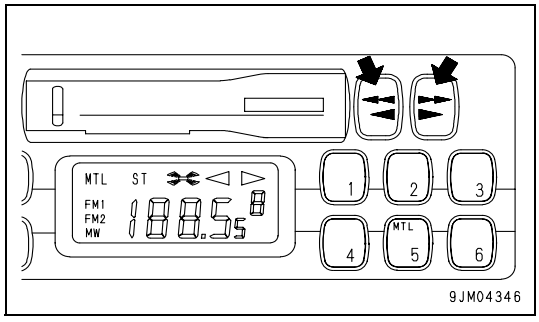
These buttons (9) are used to fast-forward or rewind the tape.

- 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.

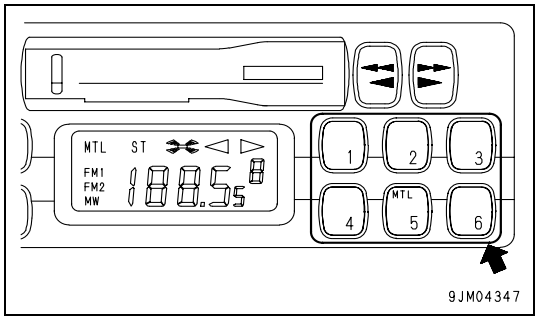
  If the fast forward and rewind buttons are pressed at the same time, the tape will change sides.



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.

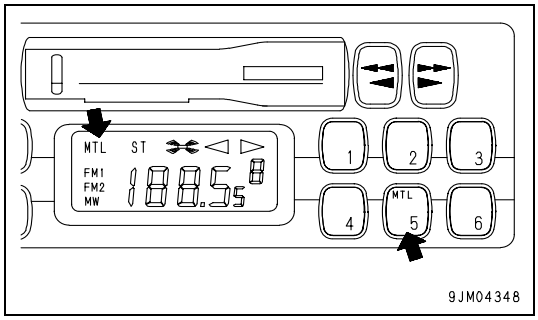
It is possible to preset 18 stations (FM: 12; AM: 6) with these buttons.



METAL TAPE BUTTON

(used also for preset button No. 5)

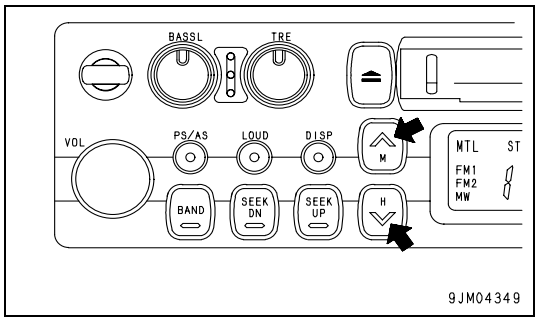
This button (11) is used when playing a metal or chrome tape. This button is also used for preset button No. 5. When it is pressed, “MTL“ appears on the display.



MANUAL TUNING BUTTONS

These buttons (12) are used for manual tuning.

When “∧“ button is pressed, the frequency goes up; when “∨“ button is pressed, the frequency goes down. If the button is pressed down and held, the frequency will change continuously.

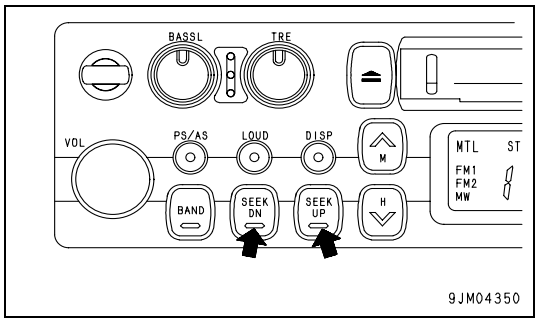


SEEK TUNING BUTTONS

These buttons (13) are used to seek tuning.

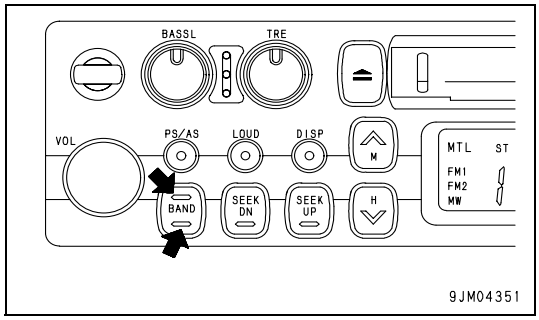
When the “SEEK UP“ button is pressed, the search automatically goes up; when the “SEEK DOWN“ button is pressed, the search automatically goes down.

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.



METHOD OF OPERATION

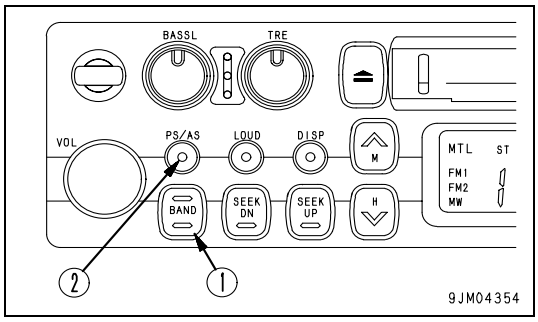
METHOD OF SETTING PRESET BUTTONS

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

REMARK
If you are playing the cassette, press the tape eject button to stop the tape.

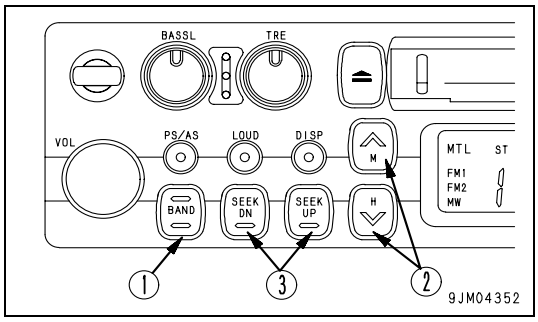
METHOD OF AUTO PRESET

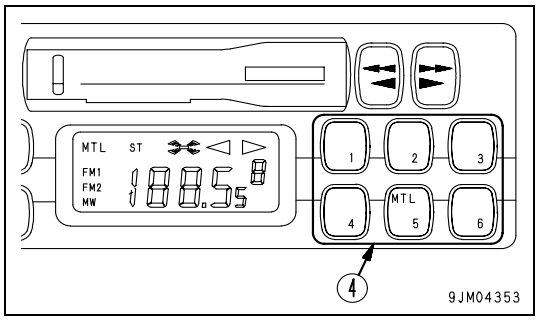
1. Use band selector button (1) to select MW (AM), FM1 or FM2.
2. Press auto-store/preset scan button (2) for less than 0.5 second.
3. The preset scan tuning function automatically searches for the desired station within the same band and can memorize as many as six stations in the preset memory.



METHOD OF MANUAL PRESET

1. Use band selector button (1) to select MW (AM), FM1 or FM2.
2. Press manual tuning buttons (2) or seek tuning buttons (3).
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).
4. Repeat the steps explained in Item 2 and 3 above to preset other stations to the subsequent numbers.
5. If you want to preset a station in the other bands, follow the steps explained in Item 1 through 4 above.

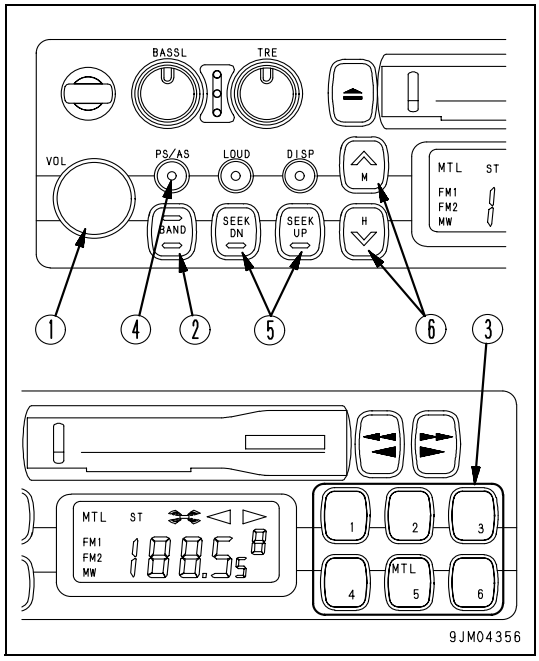




REMARK
Also, use Steps 2 and 3 when changing the setting of a preset switch to another station.
When the power is disconnected, such as when the battery is replaced, all the settings are deleted, so preset the stations again.

LISTENING TO RADIO

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



REMARK
In case you do not promptly 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 broadcasts, press the button again and scan tuning stops.

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

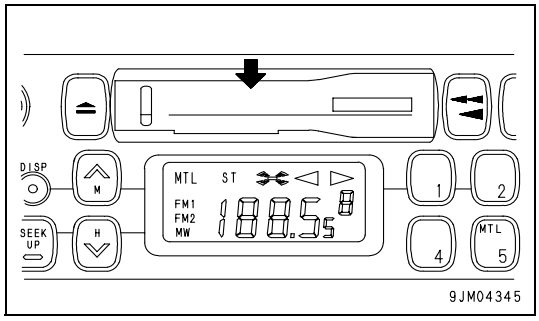
REMARK
To switch to the radio when listening to a cassette, press the cassette eject button to stop the tape.
If you insert a cassette when listening to the radio, the tape will start to play.

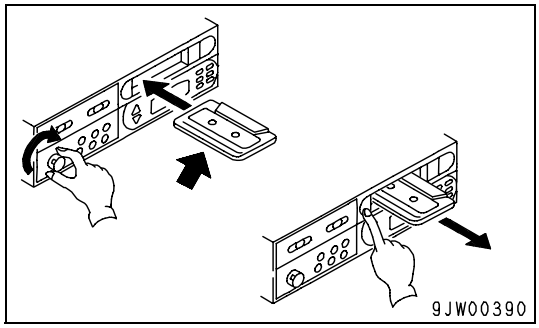
LISTENING TO A CASSETTE TAPE

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Set the cassette with the exposed portion of the tape on the right side and push it past 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.
3. When finishing with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.

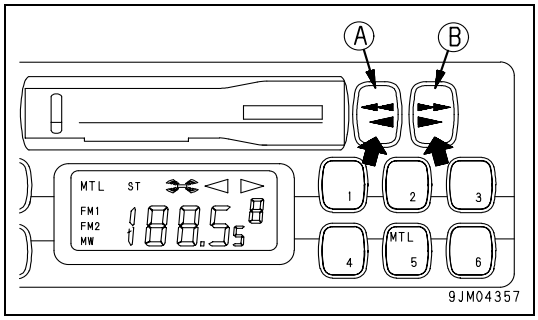




REVERSING TAPE

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.



PRECAUTION WHEN USING

⚠ WARNING

- **If a voltage greater than the specified voltage is input, it may cause fire, electrocution, or other failure. Never input any voltage other than the specified voltage.**
- **Places inside the radio are under high voltage. Do not remove the cover.**
- **Do not carry out any modifications. This may cause fire, electrocution, or other failure.**
- **If the sound cannot be heard, nothing is displayed, or any other abnormality occurs, turn off the power switch and ask your Komatsu distributor to make repairs without delay.**

- Stow the antenna when traveling in places with low overhead clearance.
- To ensure safety during operations, keep the volume at a level where it is possible to hear other machines.
- If water gets inside the speaker case or radio (auto tuning), it may cause a serious problem, take care not to let water get in these items.
- Do not wipe the scales or buttons with benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.

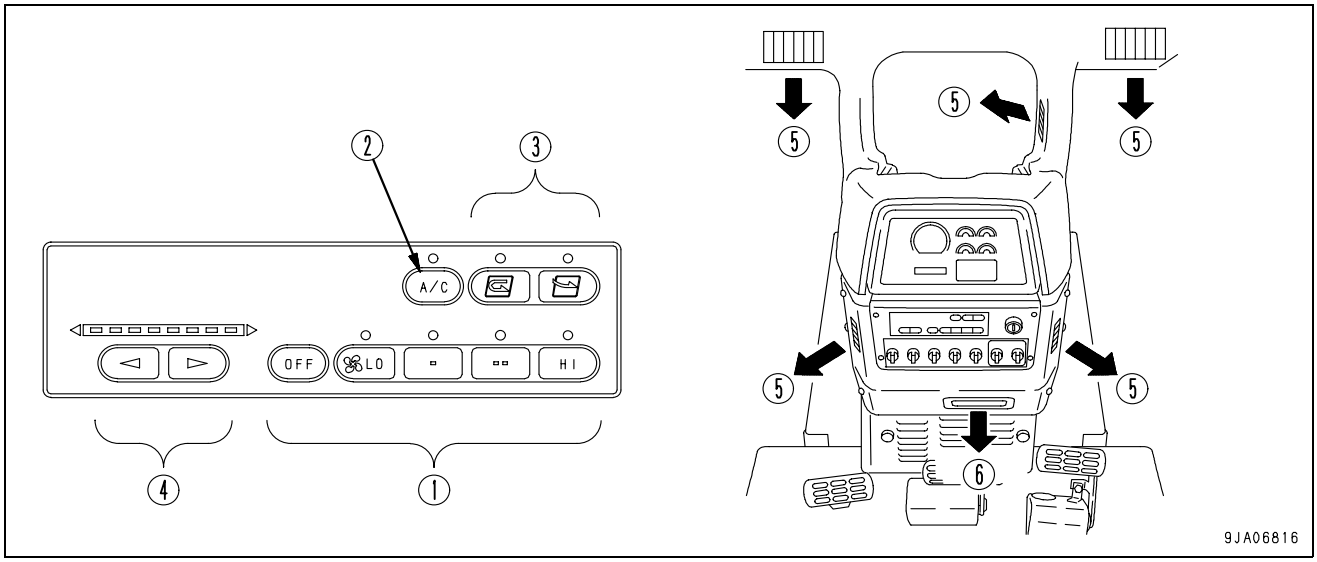
NOTICE
Handling cassette tape
Clean the tape head approx. once a month with a commercially available head cleaning tape.
Do not leave the tape any place where it is exposed to direct sunlight, any place that is excessively dusty, or any place where there is a magnetic field.
Do not use 120-minute tapes. The tape is thin and it easily gets caught up inside the machine.
If the tape is slack, it easily gets caught up inside the machine. Use a pencil to wind in the tape to remove any slack.
Do not use any cassette tape if the label has started to come off. It may cause defective rotation, or it may be impossible to get the tape out of the machine.

AIR CONDITIONER, HANDLING

(Machine equipped with cab) (If equipped)

By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL



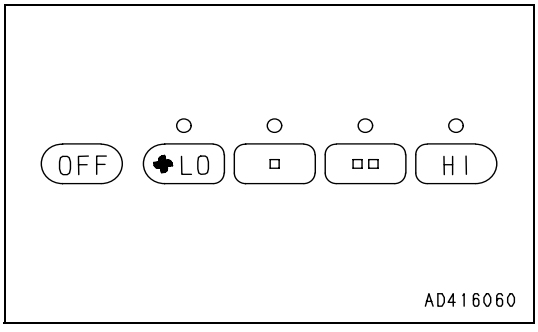
(1) Fan switch
(2) Air conditioner switch
(3) Fresh/recirc selector switch
(4) Temperature control switch
(5) Defroster
(6) Air flow to foot

FAN SWITCH

This switch (1) can be used to adjust the airflow in four stages.

It also acts as the main switch for the air conditioner. When the OFF switch is pressed, the fan stops.

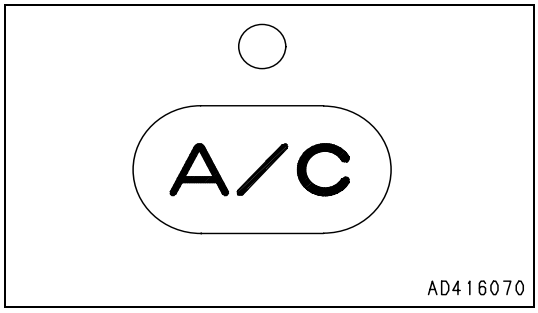
When the switch is pressed, the indicator lamp above the switch lights up to display the airflow.



AIR CONDITIONER SWITCH

This switch (2) is used to start or stop the cooling or dehumidifying function.

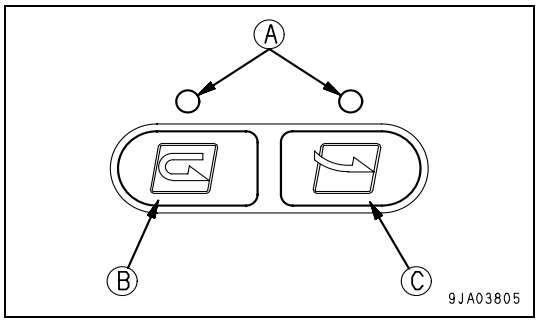
When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up. When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.



FRESH/RECIRC SELECTOR SWITCH

This switch (3) is used to select between recirculation of the air inside the cab or intake of fresh air from outside.

When the switch is pressed, indicator lamp (A) at the top of the switch lights up.



Recirculation of air inside cab

Press this switch (B) to use only the air inside the cab. Use this position to carry out rapid heating or cooling of the cab 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 taken in from the outside. Use this position when fresh air is taken in from outside the cab, or when removing the mist from the cab windows.

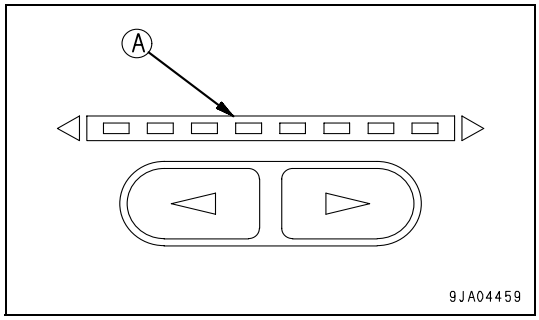
REMARK
When fresh air is taken into the cab, air pressure in the cab increases, which prevents the dust from entering. When neither heating nor cooling is needed, bring in clean fresh air to prevent the dust from coming in with your preferred airflow.

TEMPERATURE CONTROL SWITCH

The temperature can be adjusted with this switch (4) gradually from low temperature to high temperature.

The temperature level indicator lamps (A) light up to display the temperature of the air coming from the vents.

The more blue lamps on, 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 starting switch is turned OFF.

However, in the following cases, the settings must be made 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 abnormal interference from outside
- When the fan switch is turned OFF (the setting is not kept in memory with only the air conditioner switch)

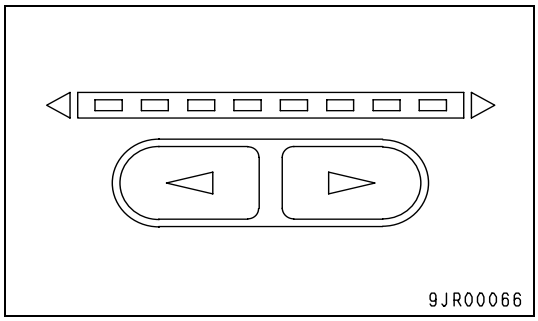
If the air conditioner is used in the FRESH position, the inside of the cab will be pressurized and this will prevent the entry of dust.

The higher the position of the fan switch, the more effective the pressurizing becomes.

METHOD OF OPERATION

SwitchsCondition of use		Fan switch	Air conditioner switch	Temperature control switch	FRESH/RECIRC selector switch
Cooling	Rapid	HI	ON	All blue	RECIRC
	Normal	HI - LO	ON	More than half are blue	FRESH
Dehumidifying, heating		HI - LO	ON	More than half are red	FRESH
Heating	Rapid	HI	OFF	All red	RECIRC
	Normal	HI - LO	OFF	More than half are red	FRESH
Defroster		HI	ON	More than half are red	FRESH
Vetilation or pressurizing		HI - LO	OFF	All blue	FRESH

When defrosting, set the temperature control switch so that all lamps are red. This will improve defrosting and demisting.



WHEN NOT USING THE AIR CONDITIONER REGULARLY

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

REMARK

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

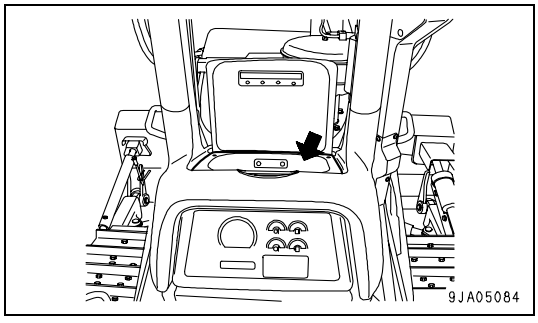
COOL BOX

When the cooling is being used, this can be used for keeping drinks and other things cool.

When the heating is being used, it can be used to keep things warm.

Do not use the cool box for things which smell or leak water or break easily.

Do not use it as a holder for tools or other small objects.



PRECAUTION WHEN USING AIR CONDITIONER

PRECAUTION WHEN USING COOLING OPERATION

- If you smoke when using the air conditioner, your eyes may start to itch or burn. Ventilate the cab ever so often to remove the smoke.
- When using the air conditioner for a long period of time, carry out ventilation process at least once every hour.

When using the air conditioner, it is recommended for health reasons, that it should only feel slightly cooler (5 or 6°C (9 or 10.8°F) lower than the outside temperature) when you enter the cab.

Therefore, adjust the temperature to a suitable level.

SET SO THAT COLD AIR DOES NOT DIRECTLY BLOW ONTO THE GLASS SURFACE

- If the vents (left and right) in the middle of the dashboard are turned so that cold air plays directly on the cab door glass, moisture may condense on the outside of the cab door glass and reduce the visibility. (This occurs particularly in high temperatures.)

  If this happens, close the louvers of the vent and change the direction to prevent the cold air from playing directly on the surface of the glas

INSPECTION DURING OFF-SEASON

Even during the off-season, run the compressor at low speed for several minutes once a week to prevent the loss of the oil film at the lubricated parts of the compressor. (Run the engine at low speed and set the temperature control lever at the central position.)

REMARK
When the ambient temperature is low, if the compressor is suddenly run at high speed, it may cause failure of the compressor. Note that the system is set so that the compressor will not run when the cooler switch is turned on, if the ambient temperature is less than 2 to 6.5°C (35.6 to 43.7°F).

PROCEDURE FOR REPLACING RECEIVER

Replace the receiver once every two years.

After replacing the receiver, add compressor oil. Turn the receiver at an angle and measure the oil remaining inside the receiver, then add the same amount of oil (Denso Oil 6) to fill the receiver.

REMARK
The replacement interval may become shorter depending on the conditions during use.
If the receiver is used when the moisture absorption limit of the desiccant has been exceeded, the refrigerant circuit may become blocked and cause the compressor to break down.

PRECAUTIONS WHEN REPLACING RECEIVER

- If the receiver is left for more than 15 minutes with the blind cover removed, the moisture in the air will be absorbed, and this will reduce the life of the desiccant. If you remove the blind cover, connect the piping quickly, evacuate the system and fill with refrigerant.
- When removing the refrigerant from the refrigerant circuit, release it gradually from the low pressure side to prevent oil from flowing out.

CHECK COMPRESSOR BELT TENSION AND REFRIGERANT (GAS) LEVEL

If the compressor belt is loose, or the refrigerant level is low, cooling is not carried out efficiently.

For details, see “WHEN REQUIRED (4-19)“.

CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop.

To prevent this, clean the air filter with compressed air once a week.

For details of the cleaning method, see “WHEN REQUIRED (4-19)“.

ACCUMULATOR, HANDLING

(If equipped)

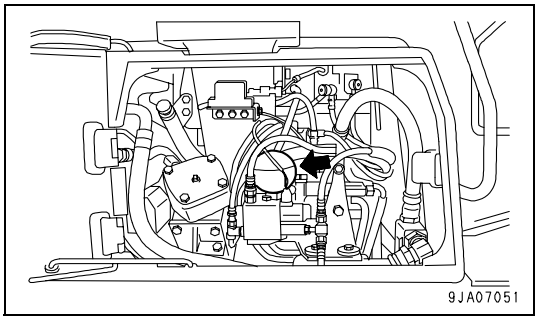
⚠ WARNING

The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion, which will lead to serious injury or damage. When handling the accumulator, always do as follows.
The pressure in the control circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation.
Loosen the bolts slowly.
Do not disassemble the accumulator.
Do not bring it near flame or dispose of it in fire.
Do not make holes in it or weld it.
Do not hit it, roll it, or subject it to any impact.
When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work carried out.

The accumulator is a device to store the pressure in the control circuit, and when it is installed, the control circuit can be operated for a short time even after the engine is stopped.

Therefore, if the control lever is moved in the direction to lower the work equipment, it is possible for the work equipment to move under its own weight.

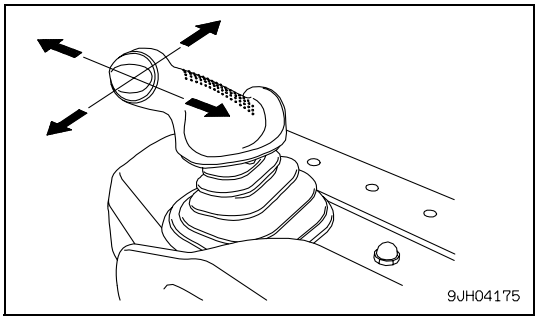
The accumulator is installed in the position shown in the diagram on the right.



METHOD OF RELEASING PRESSURE IN OPERATING CIRCUIT ON MACHINE EQUIPPED WITH ACCUMULATOR

1. Lower the work equipment and stop the engine.
2. After stopping the engine, operate control lever full strokes to the front, rear, left, and right to release pressure inside the work equipment circuit.

   However, the pressure cannot be completely released, so if accumulator in the work equipment circuit is removed, loosen the screws slowly, and never stand in the direction oil spurts out.



OPERATION

CHECK BEFORE STARTING ENGINE, ADJUST

WALK-AROUND CHECK

Before starting the engine, look around and under the machine to check for loose nuts and bolts, or leakage of oil, fuel, or coolant, and check condition of the work equipment and hydraulic system. Also check for loose wiring, play, and accumulation of dust at places which high temperatures.

⚠ WARNING

- **Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.**
  Check carefully, and if any problem is found, repair it or contact your Komatsu distributor.
- **Do not get on or off the machine from the rear. Using this position is dangerous because it is easy to slip and you cannot be seen from the operator's compartment. Always use the handrail and step at the front when getting on or off the machine.**

If the machine is at an angle, reposition it level before checking.

Perform the following inspections and cleaning every day before starting engine for the day's work.

1. Check for damage, wear, play in work equipment, cylinders, linkage, and hoses.

   Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any problem is found, repair it.

2. Remove dirt and debris from around the engine, battery, and radiator.

   Check for dirt accumulated around the engine and radiator. Also check for flammable material (dry leaves, twigs, etc.) around the battery, engine muffler, turbocharger, or other high temperature engine parts. If any dirt or flammable materials are found, remove them.

3. Check for coolant and oil leakage around the engine.

   Check for oil leakage from the engine and coolant leaks from the cooling system. If any problem is found, repair it.

4. Check for oil leakage of oil from power train case, final drive case, hydraulic tank, hoses, and joints

   Check that there is no oil leakage. If any problem is found, repair the place where the oil is leaking.

   Check for leakage of oil from the undercover. Check the ground for traces of oil leakage.

5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.

   If any problem is found, repair it.

6. Check for problems in handrails, steps, loose bolts.

   If any problem is found, repair it. Tighten any loose bolts.

7. Check for problems in gauges and monitor

   Check that there is no problem in the gauges and monitor in the operator's cab. If any problem is found, replace the parts. Clean off any dirt on the surface.

8. Seat belt and mounting clamps

   Check for damage or wear to the seat belt and mounting clamps. If there is any damage, replace with new parts.

CHECK BEFORE STARTING

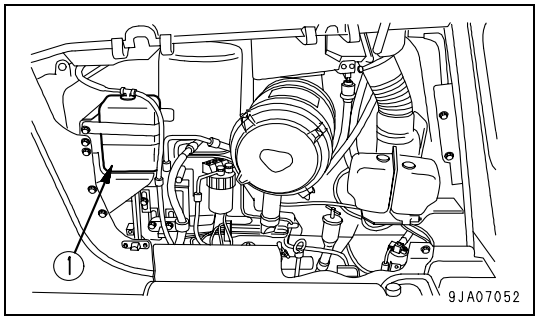
Always check the items in this section before starting the engine each day.

CHECK COOLANT LEVEL, ADD COOLANT

⚠ WARNING

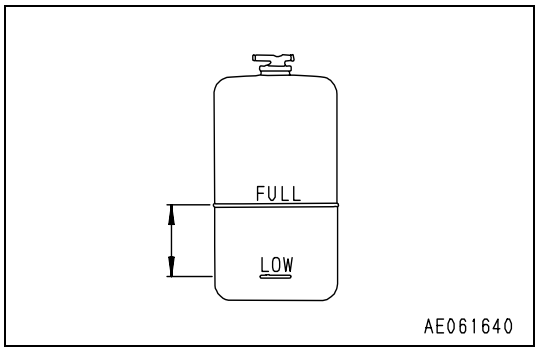
- **Do not open the radiator cap unless necessary. Wait for the engine to cool down before checking the coolant in the subtank.**
- **Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to check the coolant level in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.**

1. Open the engine side cover on the left side of the chassis, and check that the coolant is between the FULL and LOW marks on sub-tank (1). If the water level is low, add water to the FULL level through the water filler port in sub-tank (1).



REMARK
In summer, the coolant may overflow from the sub-tank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding coolant, tighten the cap securely.
3. If the sub-tank is empty, check for leakage of coolant, then add it to the radiator and sub-tank.
4. After adding coolant, close the engine side cover.

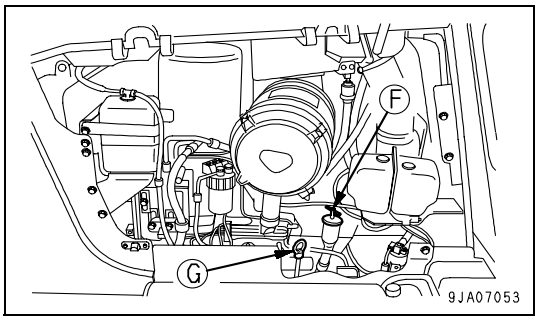


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

⚠ WARNING

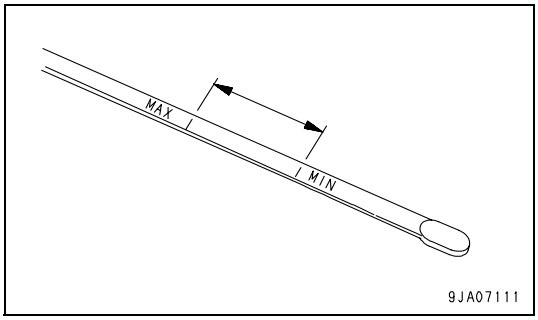
Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.

1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe (F), then remove it.



4. The oil level should be between the MAX and MIN marks on dipstick (G).

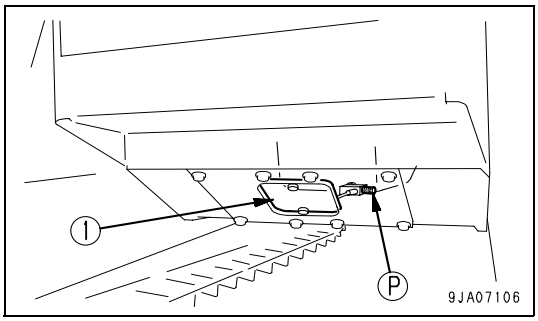
   If the oil level is below the MIN mark, add engine oil through oil filler (F).



5. If the oil level is above the MAX mark, remove cover (1) at the bottom of the machine.

   Loosen drain valve (P), drain the excess oil, then check the oil level again.

6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.



REMARK

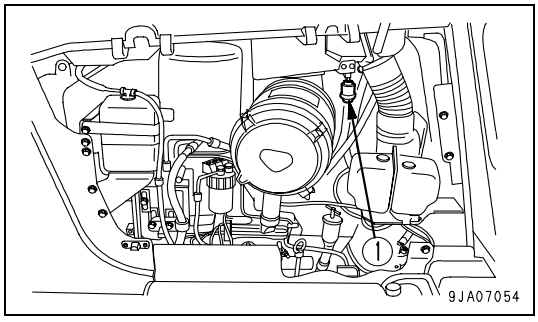
If the machine is at an angle, reposition it to level before checking.

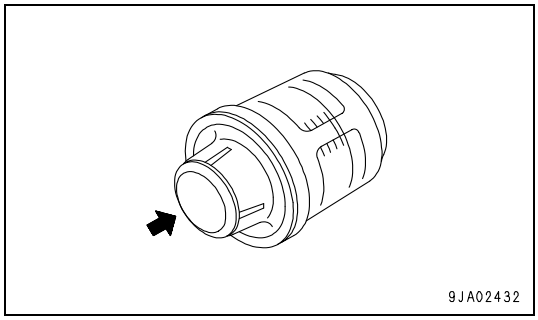
When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.

CHECK DUST INDICATOR

1. Open engine side cover on the left side of machine.
2. Check if a yellow piston in the display of dust indicator (1) has moved into the red area (7.5 kPa).
3. If the yellow piston has already moved into the red area (7.5 kPa), either clean the filter element or replace it with new one immediately.

   For cleaning the filter element, refer to the section, “CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (4-19)“, in this manual.
4. After checking, cleaning, and replacing, press the knob of dust indicator (1) to return the yellow piston to its original position.

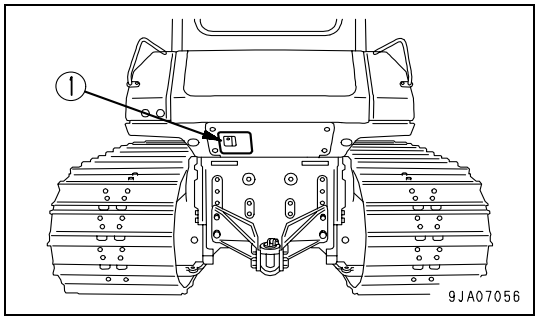




CHECK, DRAIN WATER SEPARATOR

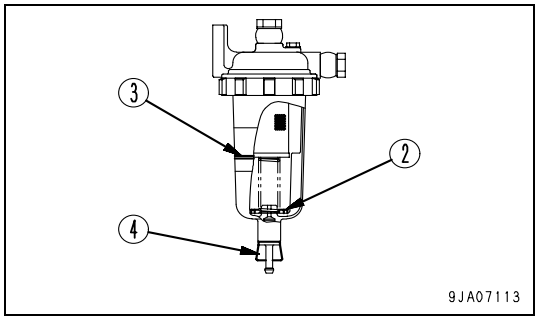
The water separator separates the water from the fuel.

1. Open the inspection cover (1) on the rear of the machine



2. Check that float (2) is still below water drain level (3).

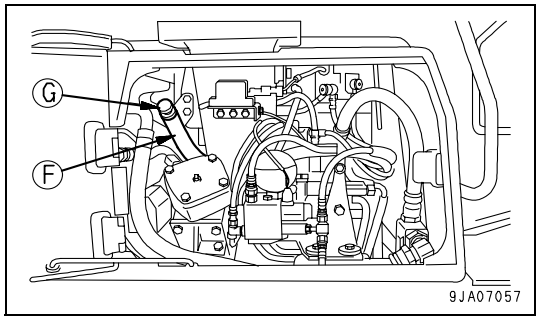
   If float (2) is above water drain level (3), drain the accumulated water as follows.
3. Loosen drain plug (4) and drain the accumulated water until the float (2) reaches the bottom.
4. Tighten drain plug (4).
5. If the air is sucked into fuel line when draining and water, be sure to bleed air in the same manner as for the fuel filter. See “REPLACE FUEL FILTER CARTRIDGE (4-55)“.



CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL

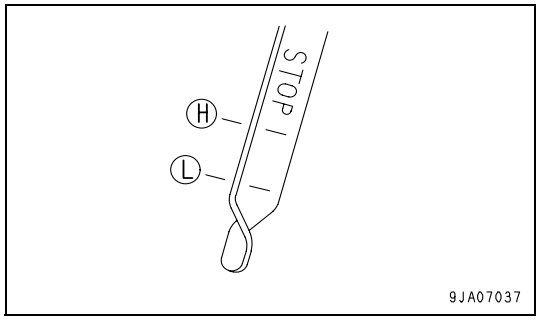
⚠ WARNING

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



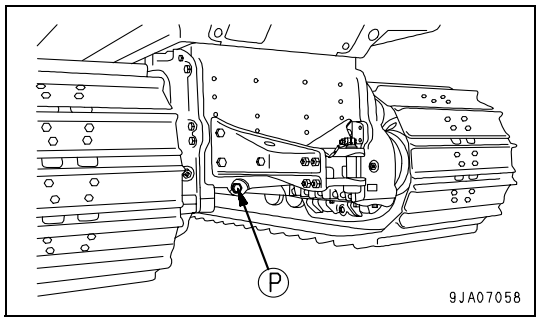
1. Open cover on the right side of the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe (F), then remove it.
4. The oil level should be between the (H) and (L) marks on dipstick (G).

   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 oil from drain plug (P), then check the oil level again.
6. If the oil level is correct, insert dipstick (G) fully into the dipstick guide again.

REMARK
If the machine is at an angle, reposition it to level before checking.
When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.



CHECK ELECTRIC WIRING

⚠ CAUTION

If the circuit breakers are activated and the fuses are blown frequently or there is a trace of short-circuiting in the wirings, check the cause immediately and either correct it by yourself or call your Komatsu distributor for the repair.
Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clear the breather hole.

Check that the circuit breakers are in normal condition (with the red button pushed in), that the fuses have no damage and fuses of the specified capacity are in use and that there is no trace of disconnection or short-circuiting in the wirings and no damage in the covers. Moreover check the terminals for loosening and retighten loosened one, if any.

Be particularly careful to check the wiring for the battery, starting motor, and alternator.

In addition, if any flammable material is accumulated around the battery, remove it.

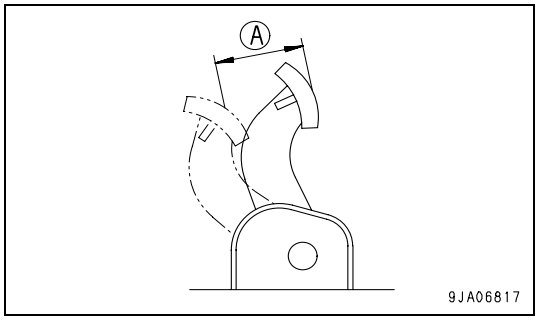
For repairs or investigation of the cause, please contact your Komatsu distributor.

CHECK BRAKE PEDAL TRAVEL

WARNING

If the brake pedal stroke is not 70 to 90 mm (2.8 to 3.5 in) (below 70 mm or over 90 mm), the brake and steering force is too strong or insufficient. If the stroke is 91 mm (3.6 in) or longer, adjust it.

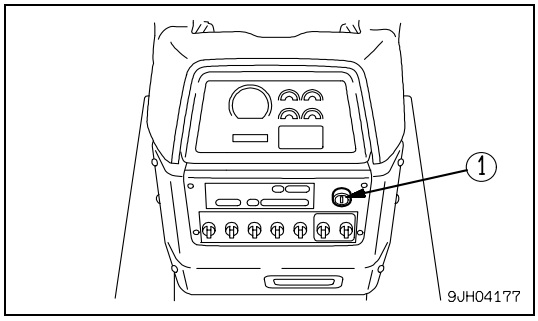
1. Depress the brake pedal all the way until it stops.
2. Check that the distance of travel (A) at the center of the pedal is 70 to 90 mm (2.8 to 3.5 in).
3. When this value exceeds 91 mm (3.6 in), or the brake fails to work, please contact your Komatsu distributor for adjustment.

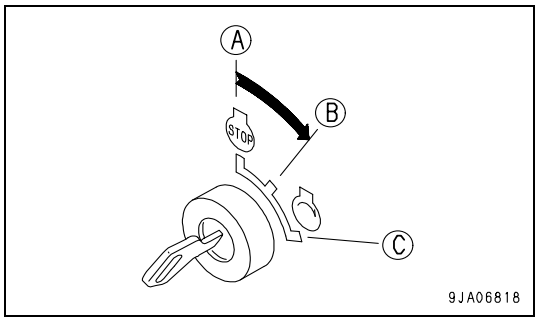


CHECKING WITH MACHINE MONITOR

1. Turn starting switch (1) to the ON position (B).
2. Check that all the monitors and gauges light up for approx. 2 seconds and the alarm buzzer sounds for approx. 2 sec.

REMARK
If the lamps do not light up, there may be a failure or disconnection in the monitor, please contact your Komatsu distributor.





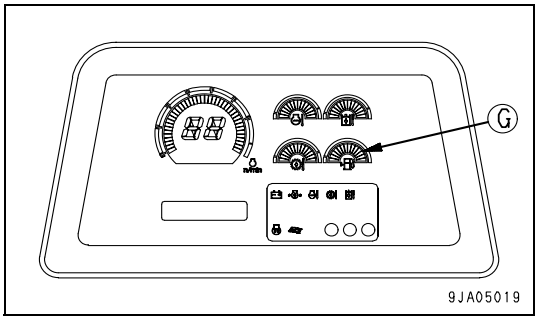
CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

When adding fuel, never spill the fuel or let it overflow. It will cause fire.
If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.
Fuel is highly flammable and dangerous. Never bring flames near fuel.

1. Turn the engine starting switch to the ON position and check the fuel level gauge (G) on the monitor panel for fuel level.

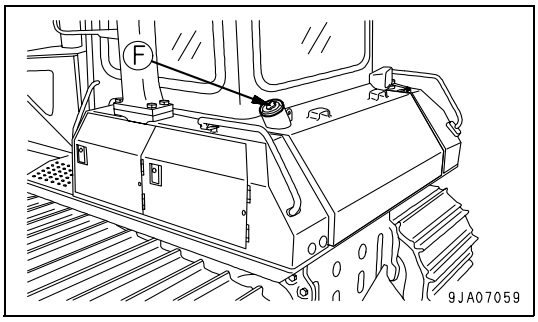
   After checking, turn the switch back to the OFF position.



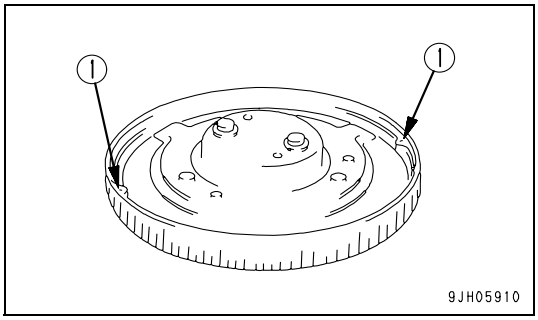
2. After completing work, fill the fuel tank through fuel filler port (F).

   Fuel capacity: 390 liters (103.04 US gal)

3. After adding fuel, tighten the cap securely.



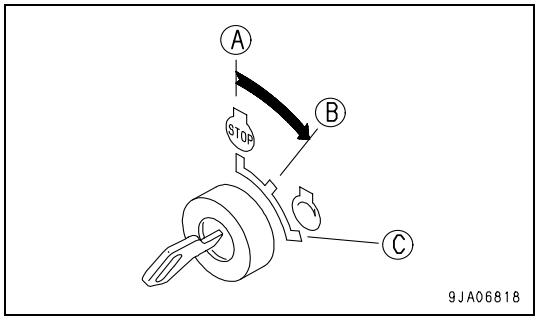
REMARK
When dozing on a grade, make sure there is plenty of fuel in the tank so that the engine fuel line does not become aerated.
If breather hole (1) on the cap is clogged, the pressure in the tank will drop and fuel will not flow.
Clean the hole from time to time.



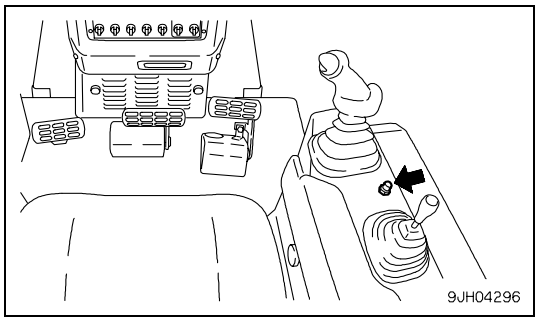
CHECK HORN SOUND

Check that the horn sounds. If it does not sound at all or the sound is extremely feeble, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn starting switch to the ON position (B).



2. Push the horn switch and check that the horn sounds.

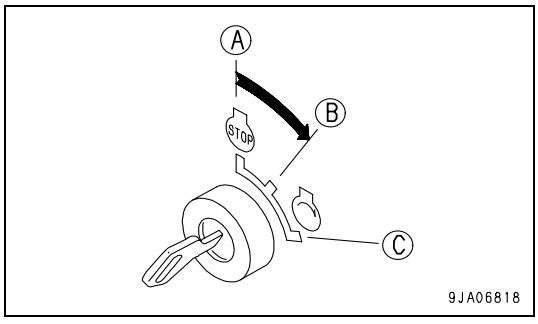


CHECK THAT LAMPS LIGHT UP

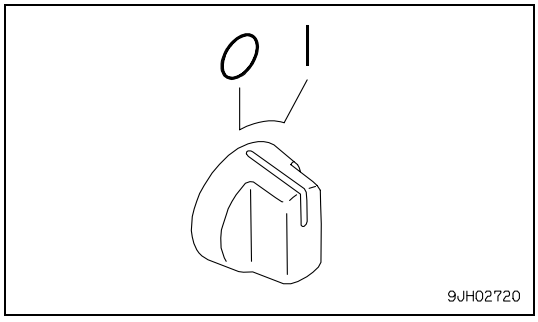
Check that the head lamp, rear lamp, additional working lamp (if equipped), and instrument lamp light up normally and they are free from stain and damage.

If the lamps do not light, check for a broken bulb or disconected wire, contact your Komatsu distributor for repairs.

1. Turn starting switch to the ON position (B).



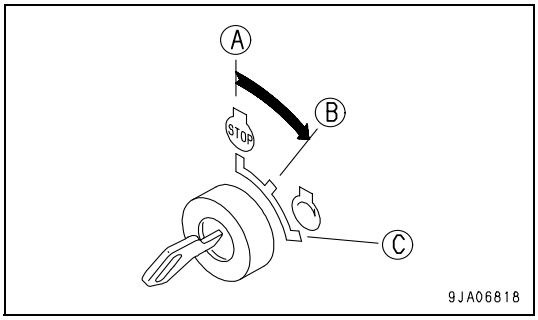
2. Turn the Head lamp and Rear lamp switches to the ON (**I**) position, and check that all the lamps light up.



CHECK OF OPERATION OF BACKUP ALARM

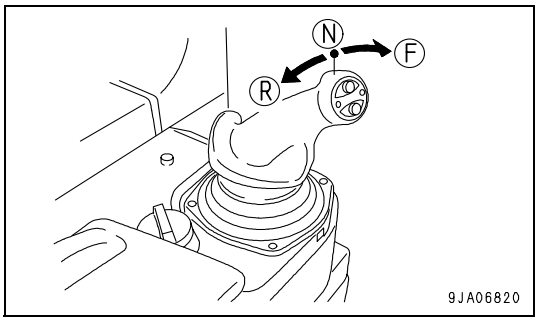
Check that the backup alarm sounds normally. If it does not, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn starting switch to the ON position (B).



2. Set the steering, forward-reverse, gear shift lever in the REVERSE position (R).

   The alarm must sound immediately at this time. The alarm keeps sounding until the steering, forward-reverse, gear shift lever is set to the NEUTRAL position (N) or FORWARD position (F).



ADJUSTMENT

ADJUST OPERATOR'S SEAT

⚠ WARNING

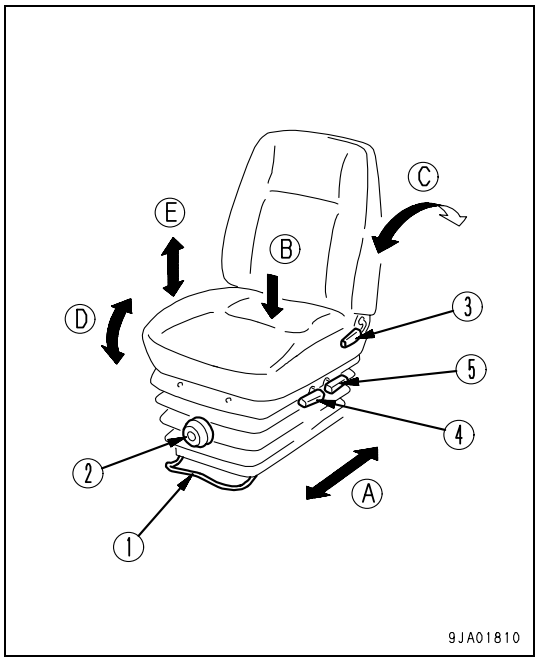
When adjusting the position of the operator's seat, always set the work equipment lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

(A) Fore-and-aft adjustment

Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm (6.3 in) (8 stages)



(B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted to 50 to 120 kg (110 to 265 lb).

REMARK
If you want to make the seat softer, turn the weight adjustment to a lower weight; if you want to make the seat harder, adjust to a higher weight.When operating on uneven surfaces, adjust the seat to a harder setting.

(C) Adjust reclining angle

Pull up lever (3) and set the seat back to a position which is comfortable for operation, then release the lever.

Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.

REMARK
The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

(D) Seat angle adjustment

- Front angle adjustment of seat (5 stages)

To raise the front of the seat, apply your weight to the seatback, while pulling up lever (4).

To lower the front of the seat, apply your weight to the front of the seat, while pulling up lever (4).

- Rear angle adjustment of seat (5 stages)

To raise the rear of the seat, stand up on your feet a little, while pulling up lever (5).

To lower the rear of the seat, apply your weight to the rear of the seat, while pulling up lever (5).

(E) Seat height adjustment

Pull up levers (4) and (5) alternately to adjust the angle of the seat.

Then, release the levers to lock the seat.

(Height adjustment distance: 5 stages, 60 mm (2.4 in))

FASTENING AND REMOVING SEAT BELT

⚠ WARNING

- **Before fastening the seat belt, check that there is no problem in the securing brackets or belt. If there is any wear or damage, replace.**
- **Even if there appears to be no problem in the seat belt, replace the seat belt once every 3 years. The date of manufacture is woven on the reverse side of the belt.**
- **Adjust and fasten the seat belt before operating the machine.**
- **Always use the seat belt when operating the machine.**
- **Do not use the seat belt with either half of the belt twisted.**

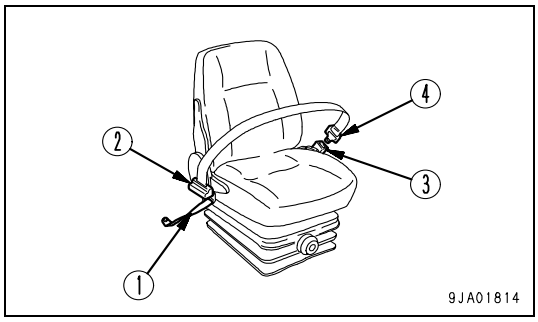
Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose.

The tightening torque for the mounting bolt is 24.5 ± 4.9 N·m (2.5 ± 0.5 kgf·m, 18.1 ± 3.6 lbft).

If the belt surface is scratched or frayed or if the fittings are broken or deformed, replace the seat belt unit.

FASTENING AND REMOVING SEAT BELT

1. After adjusting the seat position, adjust tether belt (1). Tense the tether belt and install it when there is no one sitting on the seat.
2. Sit on the seat and hold tongue (4) connected to wind-in mechanism (2) and pull out the belt slowly so that the belt will cover your abdomen sufficiently.
3. Insert tongue (4) in buckle (3) until it clicks. The belt is pulled back into wind-in mechanism (2) until it is fitted to your abdomen. The belt is locked under this condition and cannot be extended anymore. Fit the belt to your abdomen without twisting it.



REMARK
If the belt is locked before the tongue is inserted in the buckle, let it return to the wind-in mechanism, then repeat the above procedure from the start.

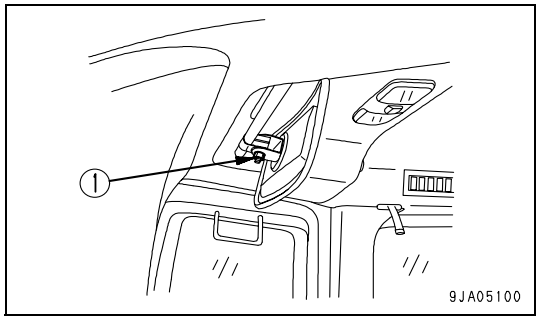
4. Pull the belt to check that it is securely locked in position.
5. When removing the belt, press the red button on buckle (3).

   The belt will automatically be wound in.

ADJUST MIRROR

Loosen nut (1) of the mirror and adjust the mirror to a position where it gives the best view from the operator's seat.

In particular, be sure to adjust the mirror so that people at the rear left or right of the machine can be seen clearly.



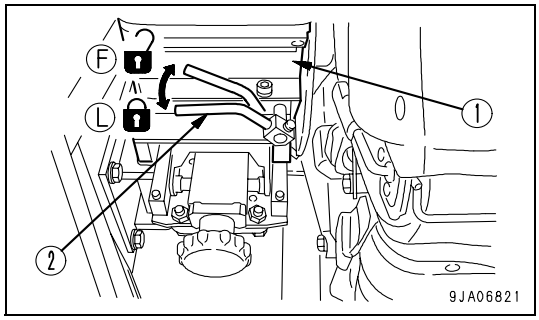
ADJUST LEFT CONSOLE BOX

⚠ WARNING

- **Before adjusting the position of the left console box, always set the parking brake lever to the LOCK position.**
- **After adjusting the position of the left console box, push and pull the console box to the front and rear to check that it is locked and cannot move. If it is not locked properly, the console box may suddenly move during operations, causing misoperation of the steering, forward-reverse, gear shift lever, and resulting in failure.**

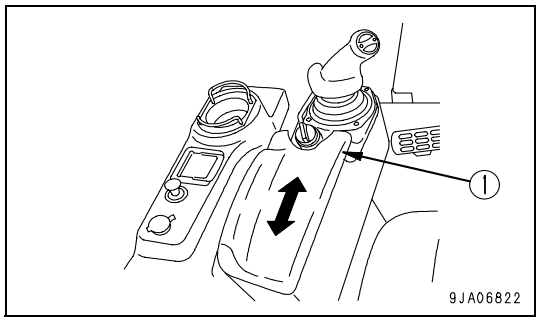
The left console box can be adjusted by 90 mm (3.5 in) in 9 stages to the front or rear. Adjust it to the most suitable position to match the adjustment of the operator's seat.

1. Pull up lock lever (2) at the rear of console box (1) at the left side of the operator's seat, and set the lock lever to the FREE position.



NOTICE
Do not grip the steering, forward-reverse, gear shift lever when removing console box (1). There is danger that the lever may break.

2. With the lock lever (2) pulled up, use your other hand to grip the front of console box (1), then move it to the front or rear with your left and right hands.



3. Move console box (1) to the desired position until a click is heard. Then pull up lock lever (2) and release it. Lock lever (2) automatically returns to LOCK position (L).

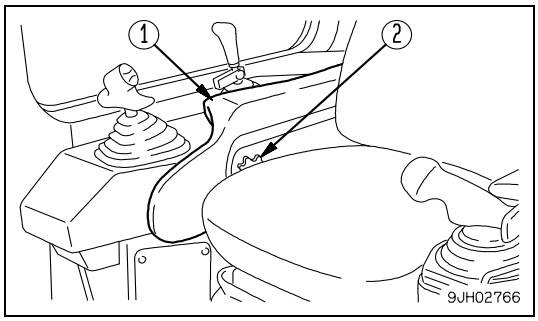
ADJUST ARMREST

The height of the armrest on the left and right sides of the operator's seat can be adjusted to 3 positions. After adjusting the operator's seat, adjust the armrest to a suitable height.

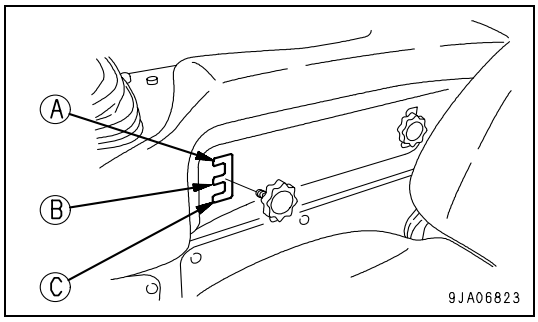
ADJUST ARMREST (RIGHT)

Armrest (1) on the right side of the operator's seat can be adjusted in 3 stages: up 30 mm (1.2 in), standard height (center), or down 25 mm (1.0 in).

1. Loosen knob (2) (2 places).



2. Move the armrest on the operator's seat to the front, then align the position of the 3 holes ((A), (B),(C)).
3. Return the armrest to the rear.
4. Tighten knob (2) securely.



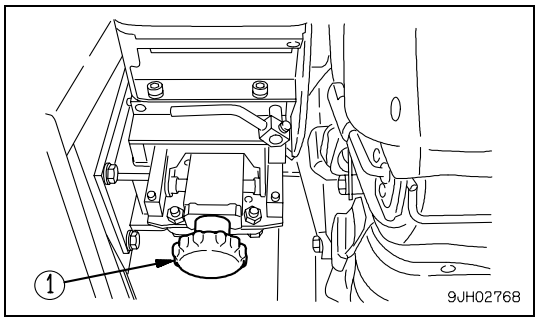
ADJUST ARMREST (LEFT)

The height of the armrest on the left side of the operator's seat can be adjusted steplessly up and down 60 mm (2.4 in) together with the console box.

Turn up/down left adjustment knob (1) to adjust the height.
Turn the knob to adjust as follows.

Turn CLOCKWISE to move DOWN

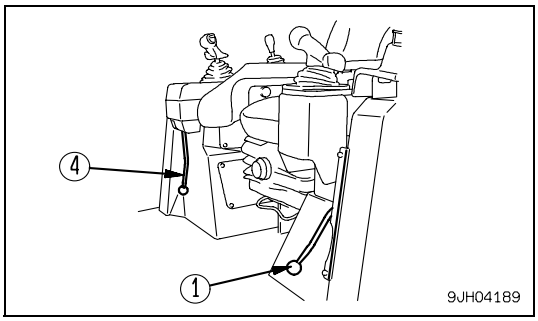
Turn COUNTERCLOCKWISE to move UP

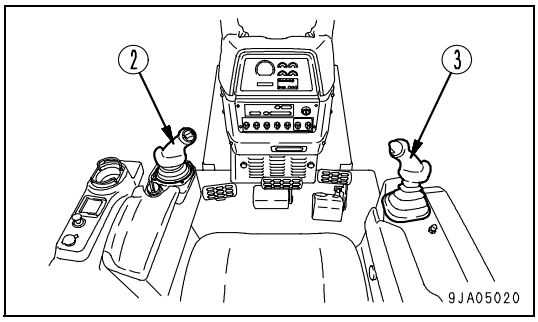


OPERATION AND CHECK BEFORE STARTING ENGINE

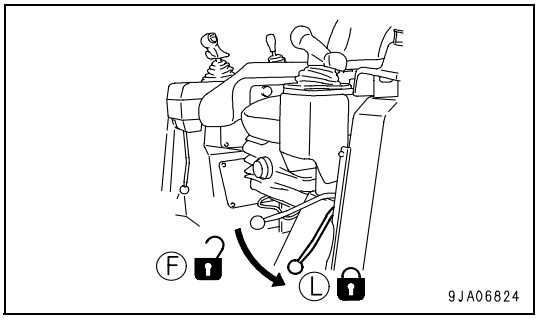
⚠ WARNING

When starting the engine, check that the work equipment lock lever are placed securely at the LOCK position. If the work equipment control lever is touched by accident when the engine is started, the work equipment may move unexpectedly and cause serious injury or damage.



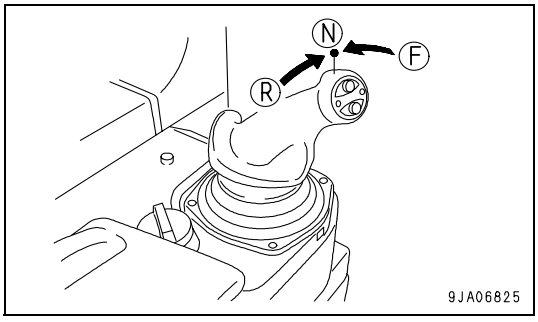


1. Check that parking brake lever (1) is in the LOCK position (L).



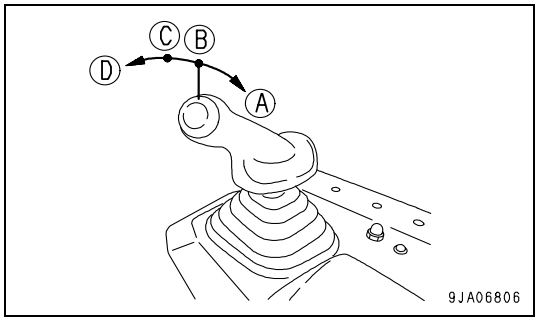
REMARK
If this parking brake lever is not in the LOCK position, the engine will not start.

2. Check that steering, forward-reverse, gear shift lever (2) is in the NEUTRAL position (N).

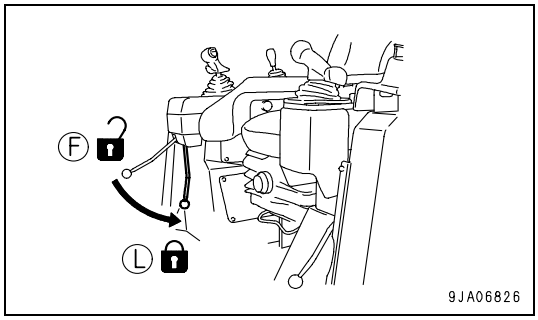


REMARK
The engine cannot be started if steering, forward-reverse, gear shift lever (2) is not in the NEUTRAL position.
If steering, forward-reverse, gear shift lever (2) is in FORWARD or REVERSE, the letter P on display panel A will flash.

3. Check that the blade is lowered to the ground and that blade control lever (3) is in the HOLD position (B).



4. Check that the work equipment lock lever (4) is LOCK position (L).



STARTING ENGINE

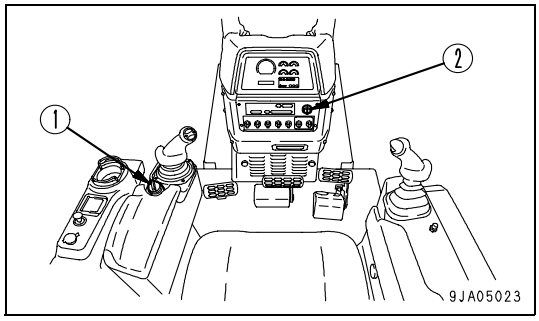
NORMAL STARTING

⚠ WARNING

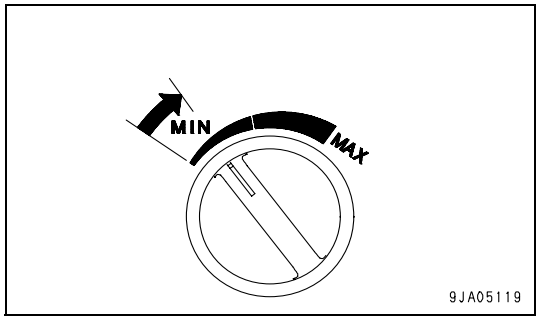
- **Sit down in the operator's seat before starting the engine.**
- **Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.**
- **Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.**
- **Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.**

NOTICE

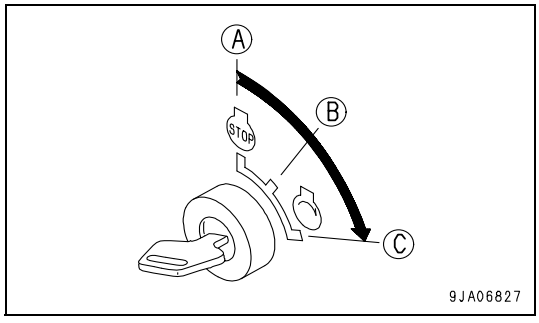
- **Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.**
- **Before starting the engine, check that the fuel control dial is at the low idle (MIN) position.**
- **If the fuel control dial is in the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.**



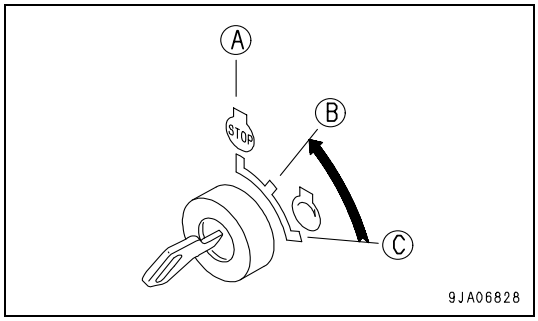
1. Turn fuel control dial (1) from the low idle (MIN) position to a slightly higher speed.



2. Insert the key into starting switch (2) and turn the key to the START position (C). The engine will start.



3. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position (B).



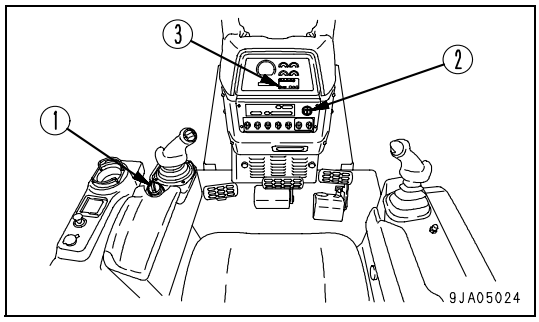
STARTING IN COLD WEATHER

⚠ WARNING

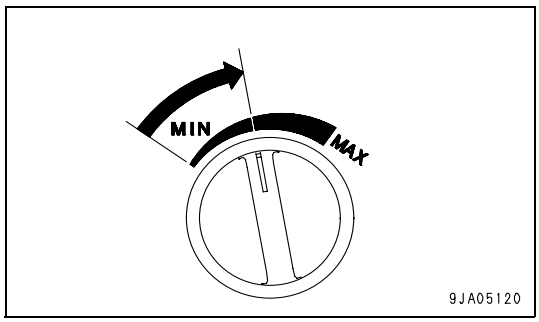
- **Start the engine only after sitting down in the operator's seat.**
- **Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.**
- **Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.**
- **Never use starting aid fluids as they may cause explosions.**
- **Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.**

NOTICE

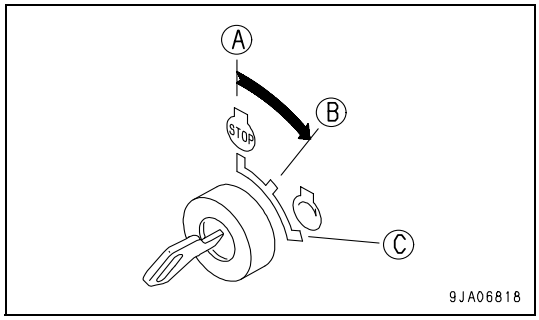
- **Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.**
- **Before starting the engine, check that the fuel control dial is at the low idle (MIN) position.**
- **If the fuel control dial is in the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.**



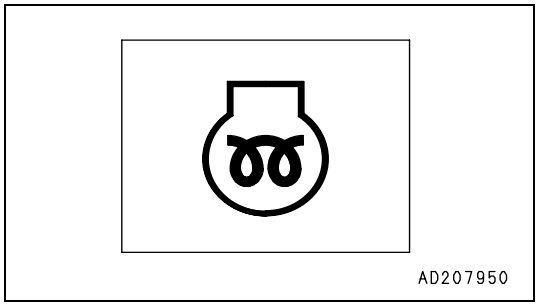
1. Turn fuel control dial (1) to the center position between MIN and MAX position.



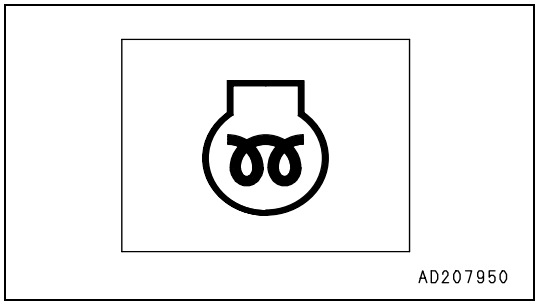
2. Insert the key into starting switch (2) and turn the key to the ON position (B).



3. Check that engine pre-heating pilot lamp (3) on the monitor panel lights up.



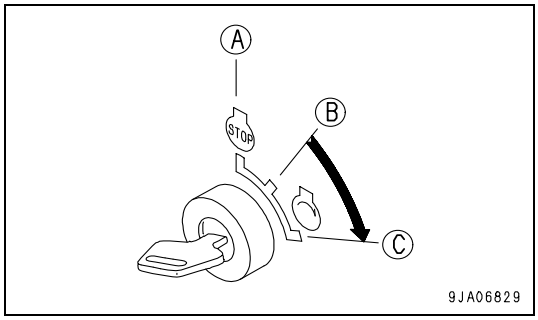
4. Maintain the key in the on position until the preheating pilot lamp (3) goes off.



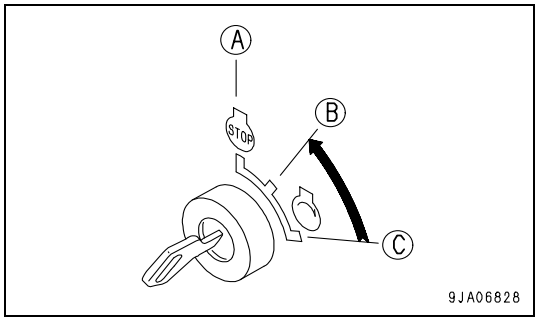
5. When preheating pilot lamp (3) goes off, turn the key of ignition switch (2) to the START position (C) to crank the engine.

   The time that preheating pilot lamp (3) stays on changes according to the ambient temperature as shown in the table below.

Ambient temperature	Preheat time
-5°C to -10°C (23°F to 14°F)	20 to 25 seconds
-10°C to -20°C (14°F to -4°F)	25 to 40 seconds
-20°C to -30°C (-4°F to -22°F)	40 to 45 seconds



6. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position (B).

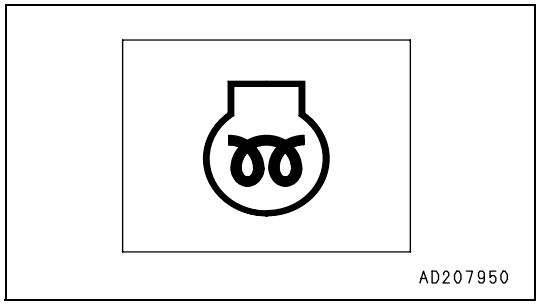


REMARK
Immediately after starting the engine, run at idle. While running the engine, release the decelerator pedal and do not operate the work equipment.
Guideline for idle time
Cold weather: At least 15 seconds
1st start after changing engine oil or engine oil filter: 20 seconds

7. When the engine rotation stabilizes, return to the low idle (MIN) position of fuel control dial (1) and then carry out the warming-up operation.

REMARK

Regardless of the ambient temperature, if the key in starting switch (2) is turned from OFF position to left, preheating pilot lamp (3) will light up and preheating will start. (Preheating continues while the starting switch is held at the left.)
For the details of the preheating time, see the table in Step 5.
While preheating is being carried out, the preheating pilot lamp (3) lights up to show that preheating is being carried out.
If the engine does not start with the above operation, wait for about 2 minutes, and repeat steps 3. And 4.



OPERATIONS AND CHECKS AFTER STARTING ENGINE

⚠ WARNING

- **If there has been any abnormal actuation or trouble, turn the starting switch key to the OFF position.**
- **If the work equipment is operated without warming the machine up sufficiently, the response of the work equipment to the movement of the control lever will be slow and the work equipment may not respond as the operator desires, so always carry out the warming-up operation. Particularly in cold areas, be sure to carry out the warm-up operation completely.**

BREAKING IN THE NEW MACHINE

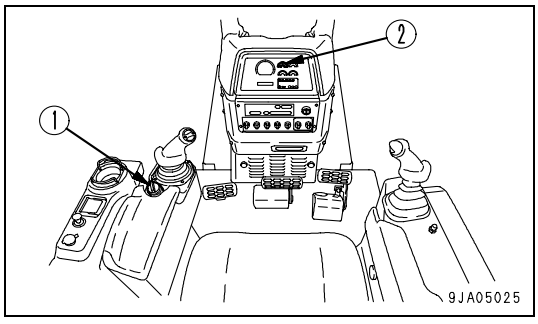
⚠ CAUTION

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.
Be sure to break-in the machine for the initial 100 hours (as indicated by the service meter).
During break-in operations, follow the precautions described in this manual.

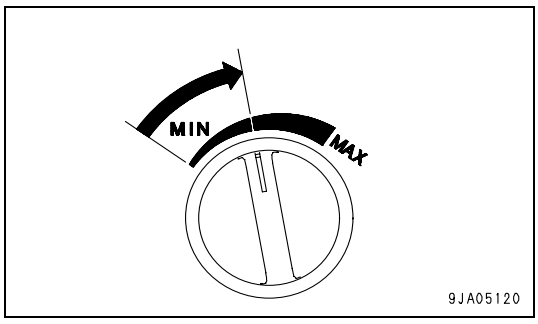
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

WARMING UP OPERATIONS

NOTICE
Avoid abrupt acceleration until warm-up run is completed.
Do not run the engine at low idle or high idle for more than 20 minutes.
If it is necessary to run the engine at idle, apply a load or run at a medium speed from time to time.



1. Turn fuel control dial (1) to the center position between LOW IDLE (MIN) and HIGH IDLE (MAX) and run the engine at medium speed for about 5 minutes with no load.



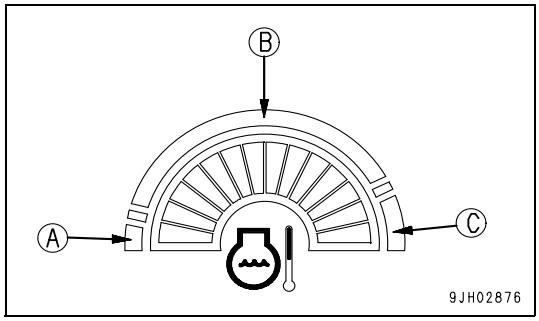
2. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.

   Continue to run the engine under a light load until engine coolant temperature gauge indicator (2) is within the green range (B).

   (A): White range

   (B): Green range

   (C): Red range



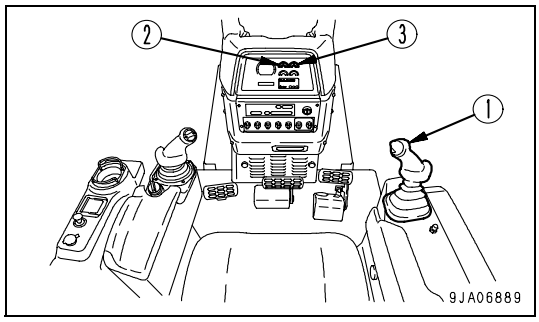
3. Check for abnormal exhaust gas color, noise, or vibration. If any abnormality is found, contact your Komatsu distributor.

STARTING IN COLD WEATHER

(Ambient temperature below 10°C (50°F))

NOTICE

- **When the hydraulic oil is at a low temperature, do not carry out operations or move the levers suddenly. Always carry out the warm-up operation. This will help to extend the machine life.**
- **Do not suddenly accelerate the engine before the warm-up operation is completed.**
  Do not run the engine at low idle or high idle con-tinuously for more than 20 minutes. This will cause leakage of oil from the turbocharger oil supply piping.
  If it is necessary to run the engine at idle, apply a load from time to time or run the engine at a mid-range speed.

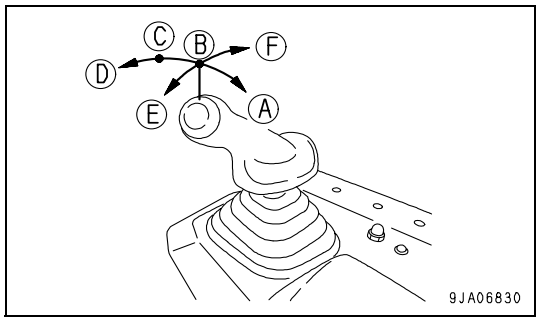


1. After starting the engine, run it for approx. 10 minutes under no load (warming-up operation).

2. Blade control lever (1) to the full RAISE position, then hold the lever in position, and operate slowly to the left tilt relief and right tilt relief positions for 5 minutes.

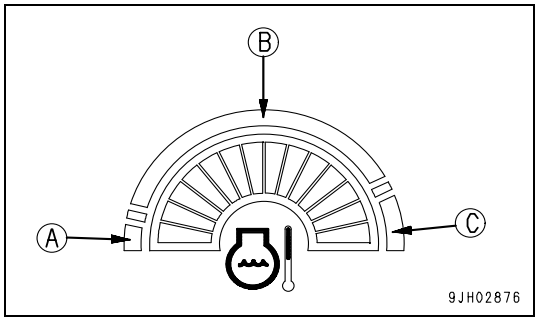
3. After this, operate the blade control lever (1) fully to the RAISE position, hold the lever in position, and relieve the left and right tilt intermittently. Next, move the lever to the LOWER position and lower the blade to the ground, then move the lever to the full FLOAT position, hold the lever in position, and relieve the left and right tilt intermittently for 5 minutes.

4. Lower the blade to the ground, move the control lever fully to the FLOAT position (lever stroke end) and hold the lever in position for 1 minute. Next, release the lever and check that it stays in the FLOAT position. After waiting for 3 minutes, return the lever to the HOLD position.



(A) RAISE
(B) HOLD
(C) LOWEW
(D) FLOAT
(E) LEFT TILT
(F) RIGHT TILT

5. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
   - Continue to run the engine at light load until engine coolant temperature gauge indicator (2) and Hydraulic oil temperature gauge (3) fall within the green range (B).



(A): White range

(B): Green range

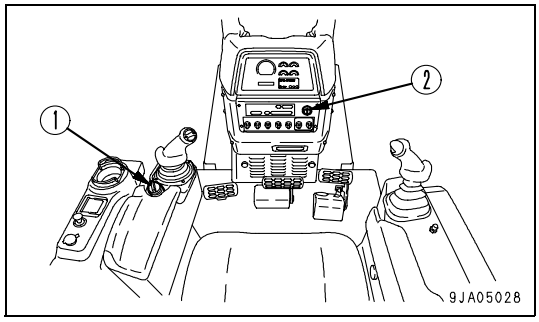
(C): Red range

REMARK
If the oil temperature in the power train is not raised properly, it will take longer to accelerate to the maximum speed.

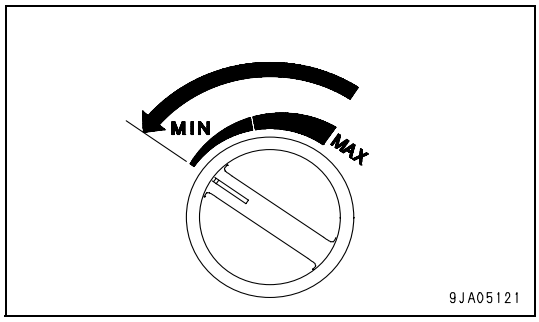
6. Check for abnormal exhaust gas color, noise, or vibration. If any abnormality is found, contact your Komatsu distributor.

STOPPING ENGINE

NOTICE
If the engine is abruptly stopped before it has cooled down, engine life may be drastically shortened. Do not abruptly stop the engine except for an emergency.
If the engine has overheated, do not stop it abruptly, run it at medium speed allowing the engine to gradually cool down, then stop it.

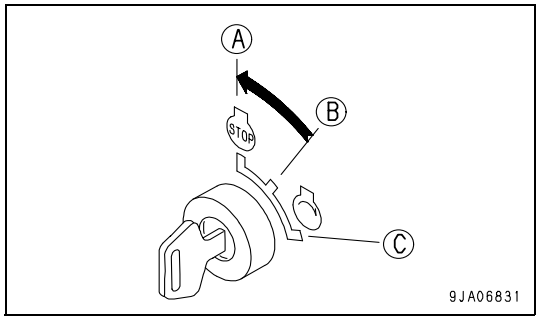


1. Lower the work equipment to the ground.
2. Place fuel control dial (1) in the low idle (MIN) position and run the engine at low idle speed for about 5 minutes to allow it to gradually cool down.



3. Turn the key in ignition switch (2) to the OFF position (A).

   The engine will stop



REMARK
When the key in starting switch (2) is turned to the OFF position, the engine stops, but the machine power supply is not cut immediately.
The power supply is maintained for several seconds to enable the controller to save the operating condition to memory and shuts down the system after that. The length of time that the power supply is maintained depends on the operating condition.
Even when the cooling fan is being operated in reverse or in the cleaning mode, the machine power supply is not cut immediately when the key in starting switch (2) is turned to the OFF position.
The power supply is maintained for seven seconds to protect the hydraulic circuit. During that time, the fan operation confirmation lamp on the monitor panel flashes.

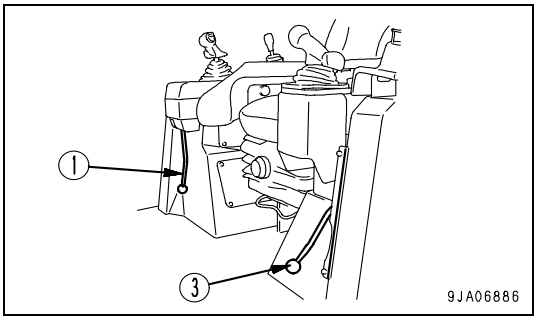
4. Remove the key from starting switch (2).

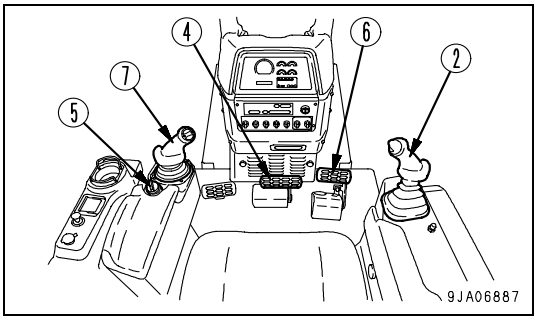
MACHINE OPERATION

MOVING MACHINE

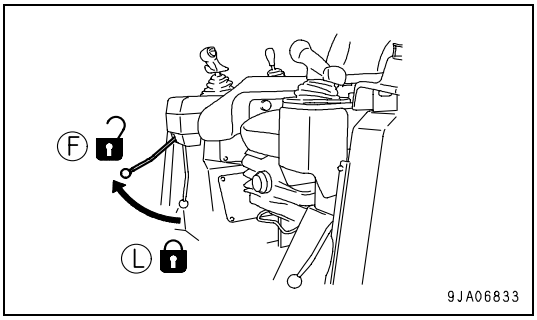
⚠ WARNING

- **When moving the machine, check that the area around the machine is safe, and sound the horn before moving.**
  Do not allow anyone to enter the area around the machine.
  There is a blind spot at the rear of the machine, so be particularly careful when traveling in reverse.
- **When starting the machine off on a slope, set the parking brake lever to the FREE position and always keep the brake pedal depressed until the travel lever is operated to the FORWARD or REVERSE position. If the brake is not applied, the machine will move under its own weight and may hit people or objects in the surrounding area and cause a serious accident.**

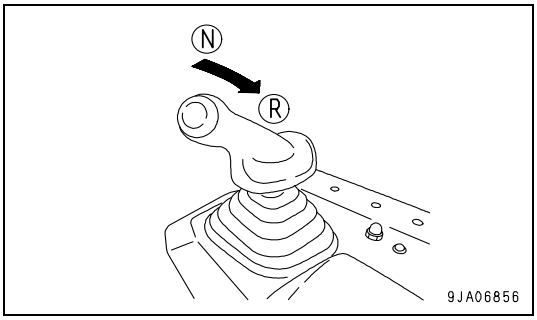




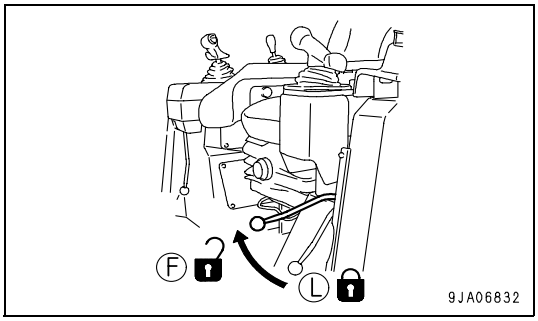
1. Set the work equipment lock lever (1) to the FREE position (F).



2. Put blade control lever (2) in the RAISE position (R) to raise the blade 40 to 50cm (15.8 to 19.7 in) off the ground.

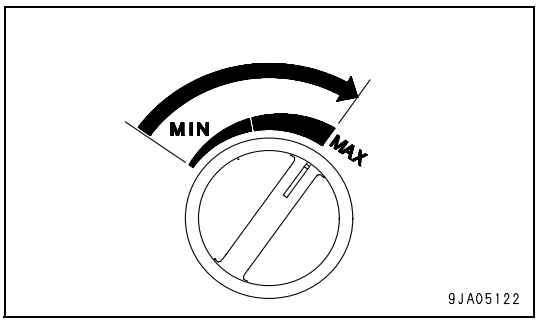


3. Set parking brake lever (3) to the FREE position (F).

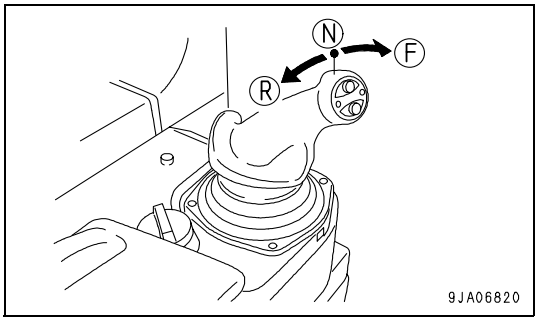


REMARK
When starting the machine off on a steep slope, depress brake pedal (4) before setting parking brake lever (3) to FREE position (F).

4. Turn fuel control dial (5) to the full speed (MAX) position, and fully depress decelerator pedal (6).



5. Move steering, forward-reverse, gear shift lever (7) to the FORWARD position (F) or REVERSE position (R), gradually release the decelerator pedal (6) and allow the machine to move.

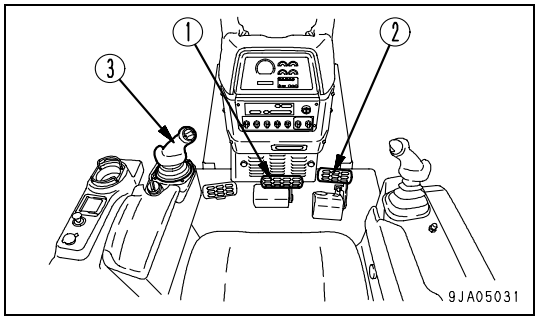


REMARK
When starting the machine off on a steep slope, release brake pedal (4) slowly, then release the decelerator pedal gradually.
Check that the backup alarm sounds when steering, forward-reverse, gear shift lever (6) is placed in REVERSE position. If the alarm does not sound, please contact your Komatsu distributor.

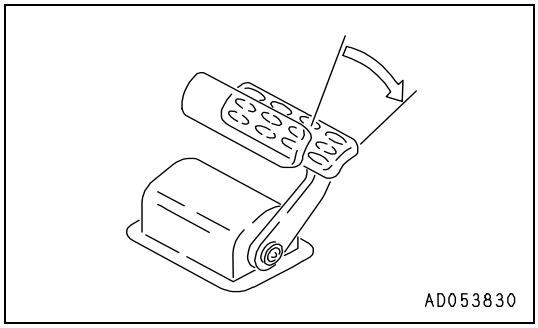
STOPPING MACHINE

⚠ WARNING

Avoid stopping suddenly. Give yourself ample room when stopping.

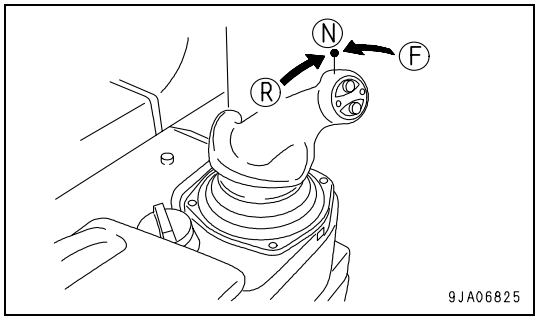


1. Depress brake pedal (1) to stop the machine.



NOTICE
If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal (2) to reduce the engine speed and travel speed before depressing the brake.

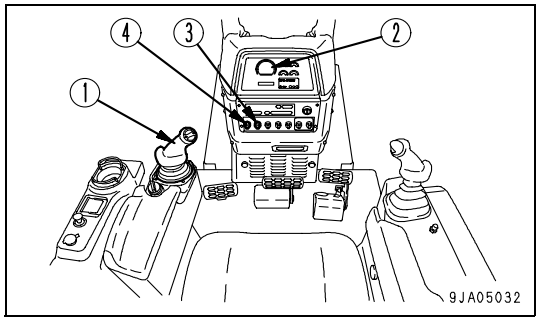
2. Move steering, forward-reverse, gear shift lever (3) to the NEUTRAL position (N), depress brake pedal (1) further, and stop the machine.



SHIFTING GEARS

The machine does not have to be stopped to shift gears.

1. Move steering, forward-reverse, gear shift lever (1) to the desired gear position to shift gears.

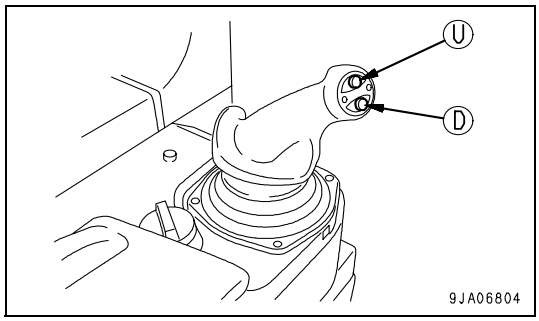


GEARSHIFTING OPERATION

When UP switch (U) or DOWN switch (D) is pushed, the transmission speed will change.

UP switch (U): Each time the switch is pressed, the transmission will up shift one speed.

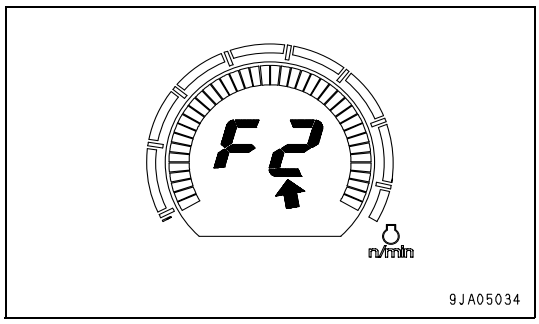
DOWN switch (D): Each time the switch is pressed, the transmission will down shift one speed.



There are 3 forward and 3 reverse speed ranges.

For details of the maximum speed in each speed range, see “SPECIFICATIONS (5-2)“.

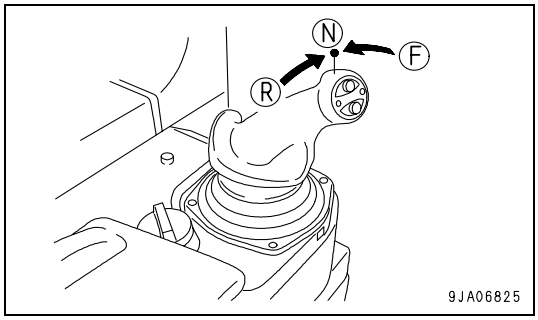
REMARK
The present speed range is displayed in the center of display panel A (2).
1st: 1 is displayed
2nd: 2 is displayed
3rd: 3 is displayed
If the machine has failed, the speed range and speed range display may change automatically.



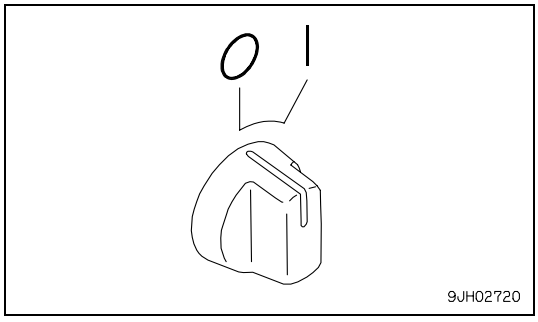
GEARSHIFTING OPERATION USING PRESET MODE FUNCTION

If the preset mode function is used, the speed ranges used when the machine travels in forward and reverse can be preset as desired.

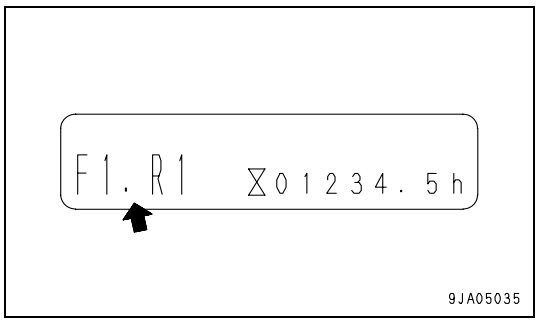
1. Set steering, forward-reverse, gear shift lever (1) to the NEUTRAL position (N).



2. When preset mode switch (3) is set to the ON position (a), the function is actuated.



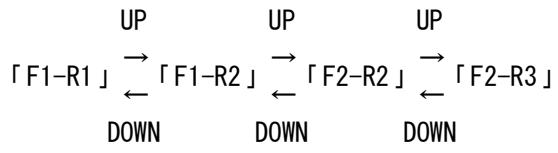
3. When the preset mode function is actuated, [F1-R1] is displayed at the left side of the bottom line of display panel B (multi-information) on the monitor panel, and the [F1-R1] mode is set.

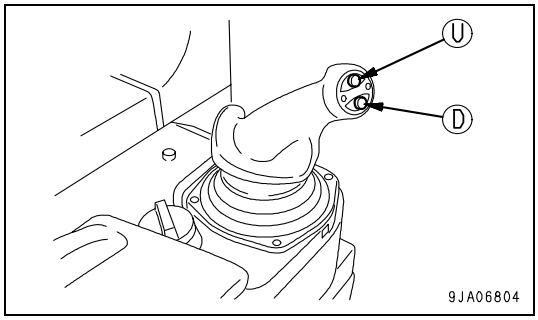


REMARK
When preset mode switch (3) is set to the ON position (a), the default [F1-R1] mode is set.

4. If it is desired to select another mode, press UP switch (U) or DOWN switch (D) on steering, forward-reverse, gear shift lever (1) and display the desired mode on control panel B (multi-information).

   The types of mode and method of selection are as follows.





- Example of shift control when [F2-R2] mode is set.

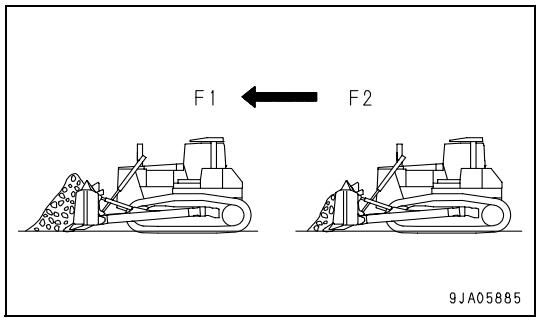
  When steering, forward-reverse, gear shift lever is set to F position, speed range F2 is automatically selected.

  When steering, forward-reverse, gear shift lever is set to R position, speed range R2 is automatically selected.

REMARK
Even when the preset mode function is being actuated, it is possible to select the speed range by operating the UP switch or DOWN switch when the machine is traveling forward or in reverse.
However, the preset mode remains set as it is. If the steering, forward-reverse, gear shift lever is returned to the NEUTRAL position and then operated again to the FORWARD or REVERSE position, the set speed range is selected.
A particular advantage is that when the auto shift down function described below is being actuated, it is possible to save the trouble of shifting up when traveling in reverse after the transmission has shifted down during digging.

AUTO DOWN SHIFT OPERATION

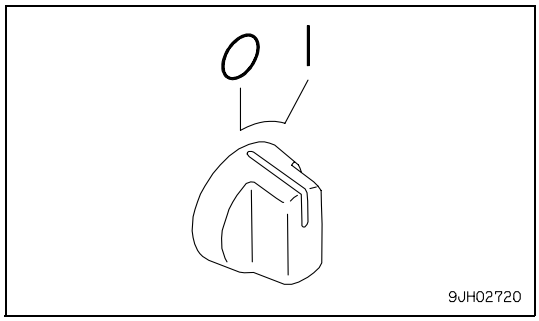
If the travel speed drops because of the load conditions when traveling, this function automatically down shifts to a lower speed range.



1. The function is actuated when auto shift down switch (4) on the front panel is set to ON position (b).

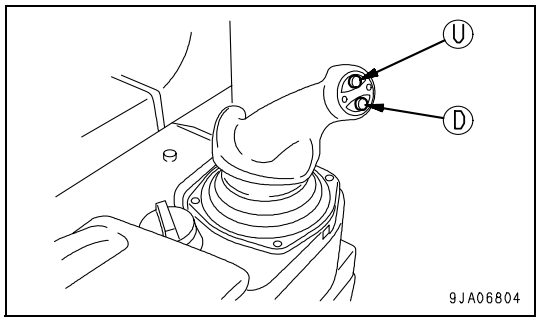
   OFF position (a) : Canceled

   ON position (b) : Actuated



   The transmission is automatically shifted down F2→ F1, F3 → F2, R2 → R1, R3 → R2.

REMARK
When the preset mode is being actuated, to ensure safety, the system is set so that it does not shift up after the auto shift down has been actuated.
If it is desired to shift up, operate the UP switch (U) manually.
However, the preset mode remains set. If the steering, forward-reverse, gear shift lever is returned to the NEUTRAL position and then operated again to the FORWARD or REVERSE position, the preset speed range is again selected.



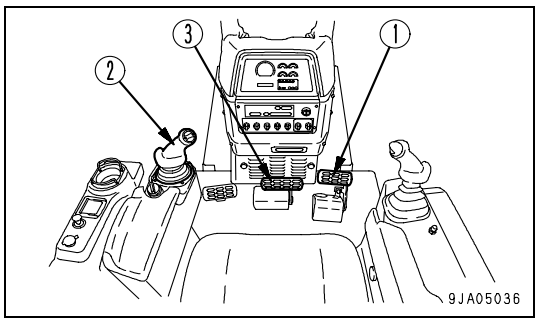
SHIFTING BETWEEN FORWARD AND REVERSE

⚠ WARNING

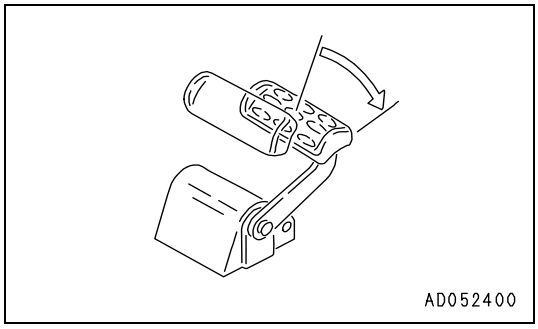
When switching between FORWARD and REVERSE, check first that the direction of travel is safe.

⚠ CAUTION

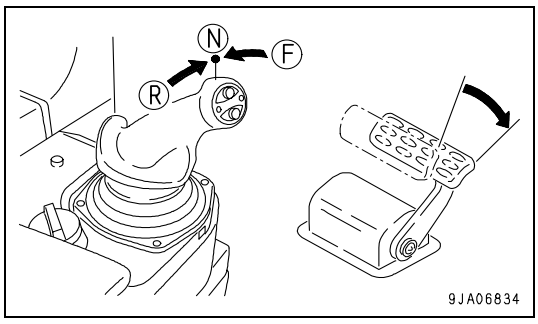
The travel direction can be changed without stopping the machine. Do not change it while the engine is running at the full speed, however, but depress the decelerator pedal to lower the engine speed before changing the travel direction for safety, comfort, and longer life of the power train.



1. Depress decelerator pedal (1) to reduce the engine speed.



2. Move steering, forward-reverse, gear shift lever (2) to the NEUTRAL position (N), reduce the speed, then depress brake pedal (3) and stop the machine.

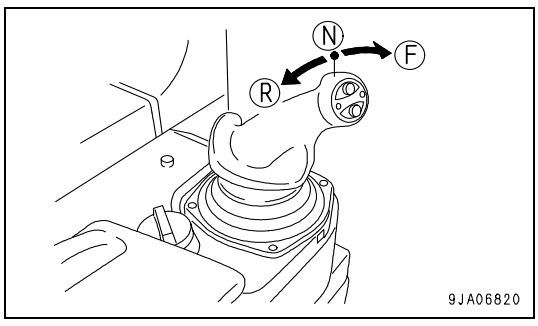


3. After depressing decelerator pedal (1), move steering, forward-reverse, gear shift lever (2) to the desired position.

   Position (F): Forward

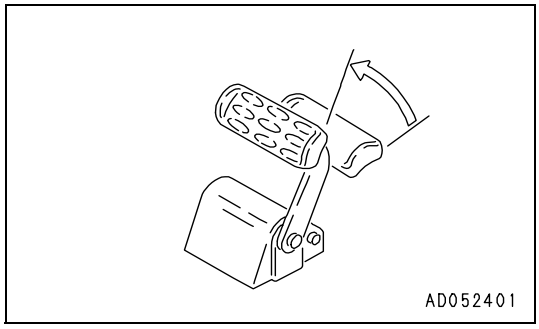
   Position (N): Neutral

   Position (R): Reverse



REMARK
Check that the backup alarm sounds when steering, forward-reverse, gear shift lever is placed in REVERSE position. If the alarm does not sound, please contact your Komatsu distributor.

4. Release decelerator pedal (1) and raise the engine speed.



REMARK
When changing direction between forward and reverse while traveling downhill, depending on the conditions of the machine, to ensure safety, the gear may shift automatically to 1st before shifting to the desired range.
For example, when changing from F2 to R2, depending on the conditions, the gear may shift F2 o R1 o R2.

STEERING MACHINE

⚠ WARNING

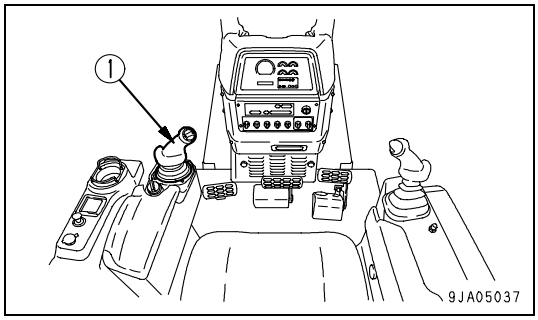
- **Avoid as much as possible turning the machine on a slope.**
  The machine will tend to slip sideways. Particular care should be taken on soft or clay land.
- **Never make a pivot turn at high speed.**

NORMAL TURNING

⚠ WARNING

When performing a counterrotation turn, the feeling of operation when your head is facing the rear is different from the feeling if you are facing the front. Never carry out a counterroatation turn while facing the rear.

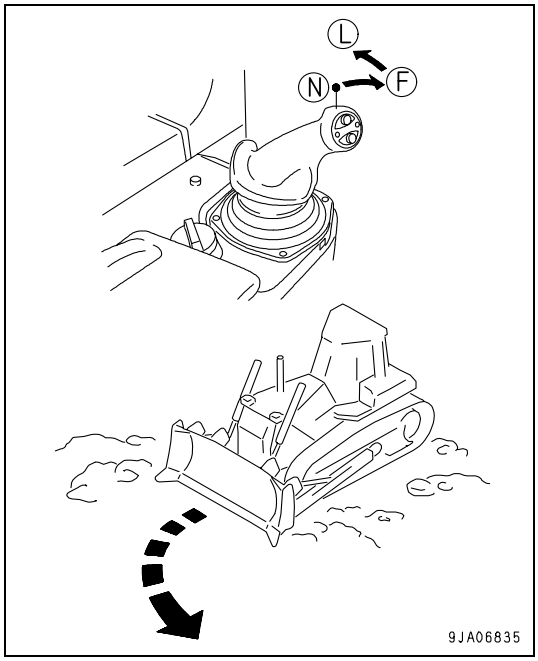
To turn the machine while traveling, incline steering, forward-reverse, gear shift lever (1) in the direction to turn.



TURNING LEFT WHILE TRAVELING FORWARD

NOTICE
If the lever is moved partially to the forward or reverse position and then is moved in the direction of turn, the machine may carry out a counterrotation turn, so operate the lever fully to the forward or reverse position.

If steering, forward-reverse, gear shift lever (1) is moved to the FORWARD position (F) and moved partially to the left (L), the machine will start to turn gradually. After that, the lever can be moved further towards the end of its travel to set the desired turning radius.



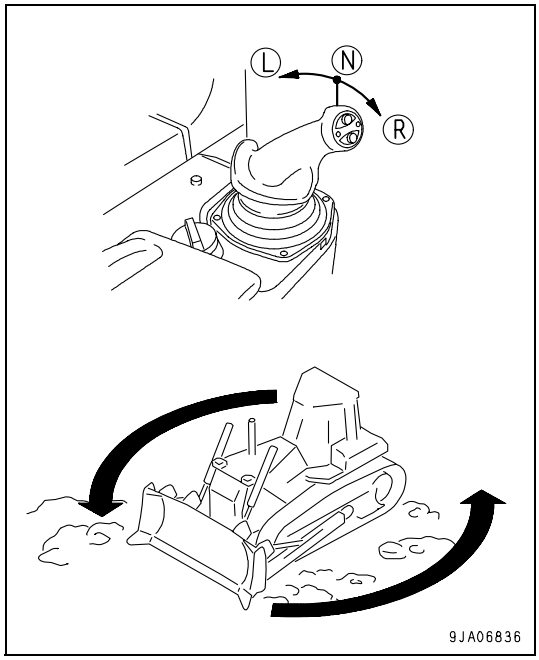
REMARK
To turn gradually to the right while traveling forward, if the steering, forward-reverse, gear shift lever (1) is operated to the FORWARD position (F) and moved slowly to the right, the machine will start to turn gradually. After that, the lever can be moved further towards the end of its travel to set the desired turning radius.

WHEN MAKING PIVOT TURN TO LEFT WHILE TRAVELING

NOTICE
When carrying out a counterrotation turn, if the load is not equal on the left and right sides, the machine may carry out a pivot turn, so check the ground conditions and be careful not to hit any obstacles.

With steering, forward-reverse, gear shift lever (1) in the N position, operate the lever partially to the left (L). The left and right tracks will rotate in opposite directions, and the machine will make a slow counterrotation turn. If the lever is moved further, the speed of the counterrotation turn will increase.

REMARK
When making a right counterrotation turn, move the steering, forward-reverse, gear shift lever (1) to the right (R) in the same way.



PRECAUTIONS FOR OPERATION

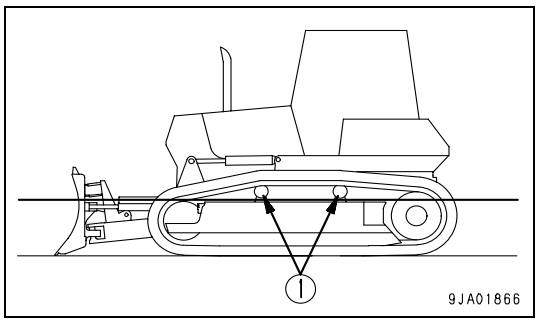
PAY ATTENTION TO GAUGES

When the red range lights on the power train oil temperature gauge while operating, reduce the load and wait for the temperature to decrease.

PERMISSIBLE WATER DEPTH

When operating in water, always keep the bottom of carrier rollers (1) above the surface of the water. Also, be careful that the engine cooling fan will not come in contact with water. The fan can be damaged.

After operating the machine for a long time in water, carry out greasing of the greasing points.



PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

METHOD OF USING DECELERATOR PEDAL

When stepping on the decelerator pedal while going uphill, climbing ability will be reduced and the machine will stop.

Furthermore, the engine may stall.

USE ENGINE AS BRAKE

When going downhill, move steering, forward-reverse, gear shift lever into low speed to run engine at slow speed and travel down slope using the engine as a brake.

Do not move the steering, forward-reverse, gear shift lever to the NEUTRAL position.

When traveling down hills of more than 15°, shift down to 1st speed (R1 or F2).

BRAKING WHEN TRAVELING DOWNHILL

While descending a slope using the engine as a brake, also apply the brakes.

Failure to brake may result in overrunning, causing engine trouble.

PRECAUTIONS ON SLOPES

BE CAREFUL OF FUEL LEVEL

If the fuel level in the fuel tank becomes low when working on slopes, the engine may suck in air because of the angle of the machine or the swaying of the machine. If this makes the engine stop, the braking effect will be reduced, so be careful not to let the fuel level in the fuel tank become too low.

BE CAREFUL OF OIL LEVEL

When operating machine on sloped areas of more than 20°, fill all appropriate components with oil to H level.

PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

If the engine stops while working or traveling on a hill, immediately depress the brake pedal to bring the machine to a complete stop.

METHOD OF USING BRAKES

The following actions cause premature damage to the brakes, so avoid such operations.

- Using emergency brake at full speed
- Using brake with engine running at full speed in first gear (F1, R1) (Machine stall condition)

REMARK
Always depress the decelerator pedal to lower the engine speed before actuating the brakes.

IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS

(Machines equipped with cab)

Always keep the door closed when traveling or carrying out operations.

If the door is open, there is danger of damage from obstacles or strong vibration.

IT IS PROHIBITED TO MODIFY THE CAB GLASS IN ANY WAY THAT WILL OBSTRUCT THE VIEW

(Machines equipped with cab)

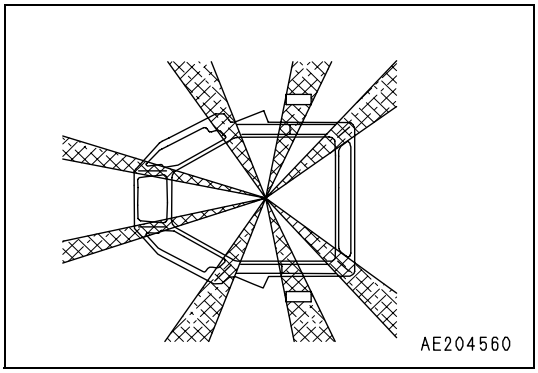
- For safety reasons, do not install anything to the cab glass that will obstruct the view.
- Always keep the glass clean to ensure safety during operations.

PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB AND ROPS STRUCTURES

(Machines equipped with cab)

⚠ WARNING

The cab structure may cause blind spots.
When operating, always be sure to check carefully that there is no obstacle or worker in the surrounding area.

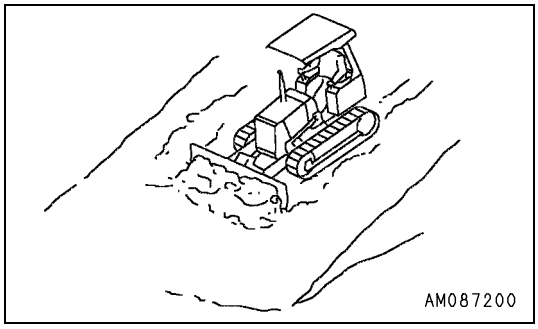


WORK POSSIBLE USING BULLDOZER

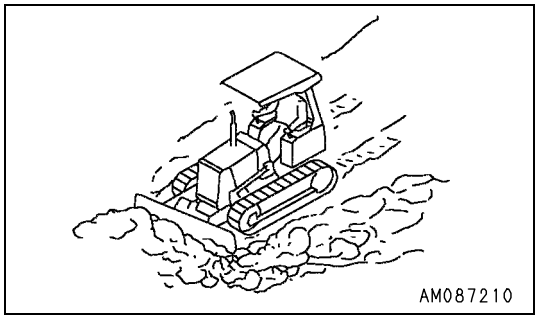
In addition to the following, it is possible to further increase the range of applications by using various attachments.

DOZING

A bulldozer digs and transports dirt in a forward direction. Slope excavation can always be most effectively carried out by proceeding from the top downward.



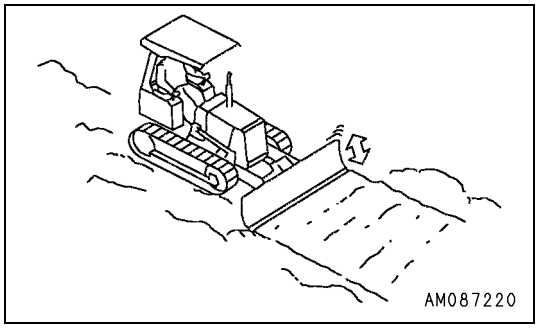
When dozing toward one side only, operate with angled blade (angledozer only).



SMOOTHING

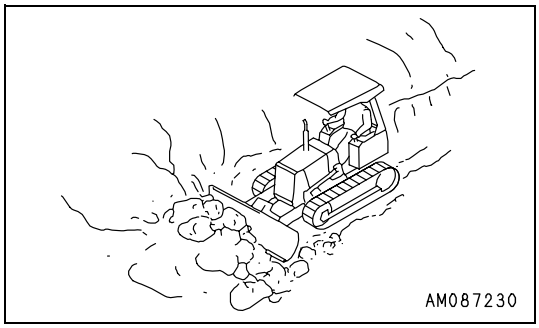
NOTICE
Avoid smoothing on rocky or stony ground. It can damage the blade.

To finish the ground to a flat surface after digging or leveling, put a full load of soil in front of the blade and operate the blade up and down in small movements while traveling forward. Finally, place the blade at FLOAT and travel at low speed in reverse while pulling the blade over the ground surface. Before doing this, hold the lever by hand at the FLOAT position for at least 1 second to make sure that it stays in position. To prevent damage to the blade, be careful not to travel over any stones or rocks.



CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

For digging and ditch excavation of hard or frozen ground, tilt the blade. Even hard ground can be dug effectively by a tilted or angled blade.



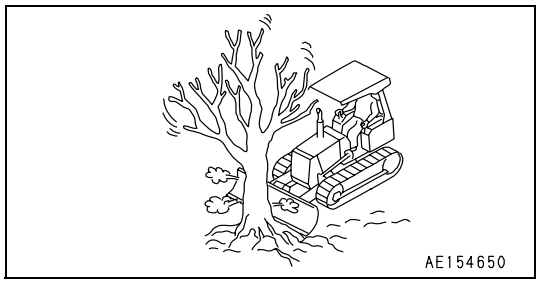
FELLING TREES, REMOVING STUMPS

NOTICE
Do not uproot trees or stumps or fell trees by angling or tilting the blade.

For trees with a diameter of 10 to 30 cm (3.9 to 11.8 in), raise the blade high and push 2 or 3 times to fell the tree.

Next, travel in reverse, and dig the corner of the blade into the ground to cut and dig up the roots.

When doing this, never hit the tree at high speed or apply shock to fell the tree.



ADUSTING POSTURE OF WORK EQUIPMENT

ADJUST ANGLE OF BLADE EDGE

(Power tiltdozer only)

⚠ WARNING

It is dangerous if the work equipment moves by mistake when adjusting angle of the blade edge. Set the work equipment in a stable condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.

Adjust the angle (θ) of the blade edge to match the type of soil.

The angle of the blade edge of the power angle, power tiltdozer cannot be adjusted.

POWER TILTDOZER

Turn the brace with bar handle (1) and the distance (ℓ) between the joints to change the cutting angle (θ) as follows.

INCREASE distance (ℓ) to INCREASE angle (θ)

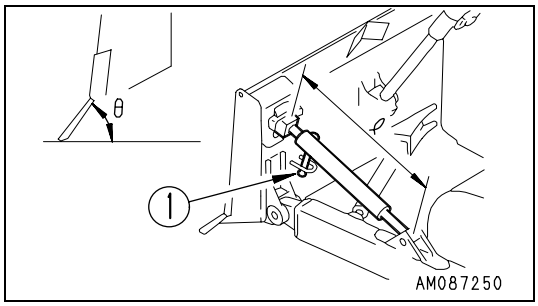
DECREASE distance (ℓ) to DECREASE angle (θ).

The standard for the cutting angle (θ) is 55°.

The standard distance between the joints (ℓ) is as follows.

D61EX: 960 mm (37.8 in)

D61PX: 960 mm (37.8 in)



ADJUST AMOUNT OF TILT POWER TILT

⚠ WARNING

When adjusting the amount of tilt, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.

POWER TILTDOZER

1. The following amount of tilt can be obtained by operating the blade control lever.

   D61EX: 470 mm (18.5 in)

   D61PX: 420 mm (16.5 in)

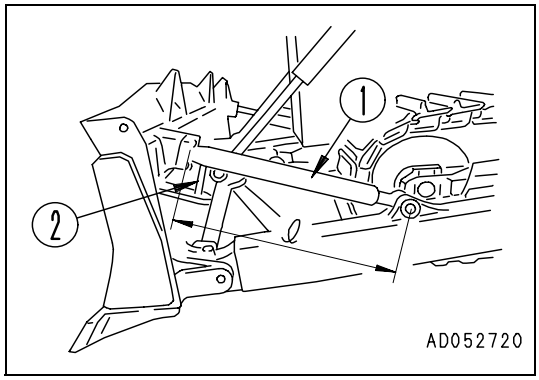
2. If it is required to tilt more than the condition obtained in step 1 above, turn brace (1) with adjustment rod (2) installed to it to change its length.

   - Adjustment range of distance between joints (ℓ)
     D61EX: 935 to 990 mm (36.8 to 39.0 in)

   D61PX: 935 to 990 mm (36.8 to 39.0 in)

   - Max. amount of tilt
     D61EX: 690 mm (27.2 in)

   D61PX: 600 mm (23.6 in)



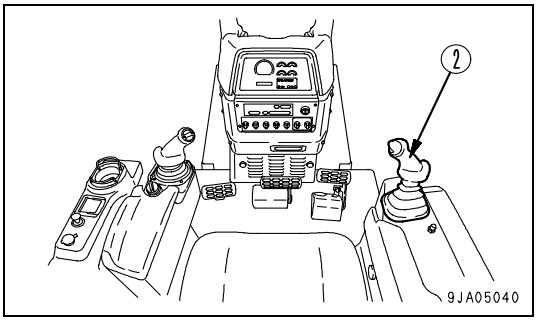
NOTICE
If the brace is lengthened more than the maximum amount of tilt, excessive forces are applied to various parts. Accordingly, do not lengthen the brace more than the maximum amount of tilt.

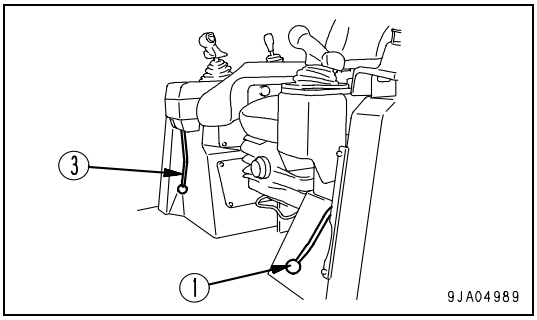
REMARK
When adjusting the amount of tilt as explained in step 1 and 2 above, keep the blade above the ground.

PARKING MACHINE

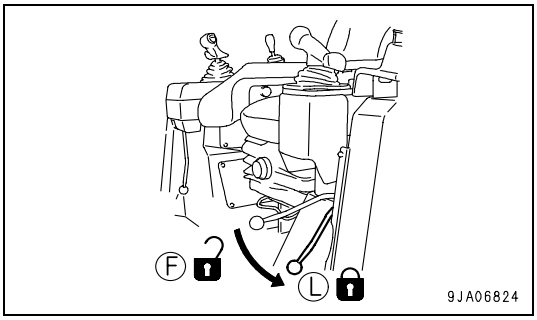
⚠ WARNING

- **When stopping the machine, select flat hard ground and avoid dangerous places.**
  If it is unavoidably necessary to park the machine on a slope, place the parking brake lever in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the ground.
- **If the work equipment control lever is touched by accident, the work equipment may move suddenly, and this may lead to a serious accident. Before leaving the operator's seat, always operate the work equipment lock lever and parking brake lever to place it securely at the LOCK position.**

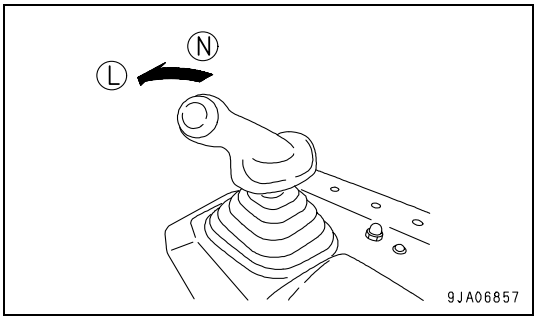




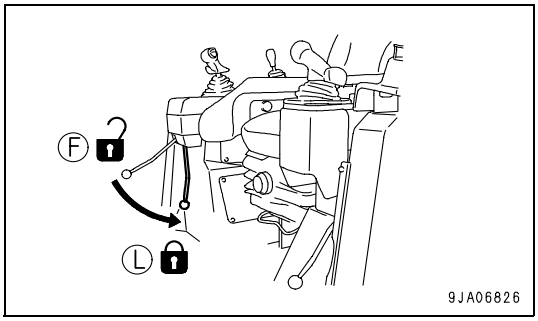
1. Stop the machine. For details, see “STOPPING MACHINE (3-100)“.
2. Set parking brake lever (1) to the LOCK position (L) and apply the parking brake.



3. Move blade control lever (2) to the LOWER position (L), and lower the blade to the ground.



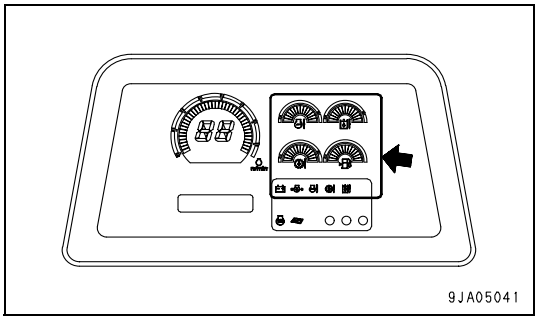
4. Set work equipment lock leve (3) in the LOCK position (L).



CHECK AFTER FINISHING WORK

BEFORE STARTING ENGINE

Use the meters and caution lamps to check the engine coolant temperature, engine oil pressure, fuel level, and Power train oil temperature.



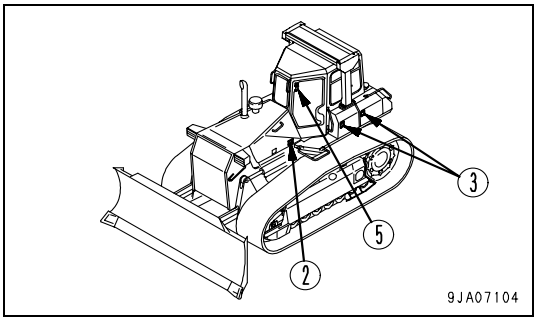
AFTER STARTING ENGINE

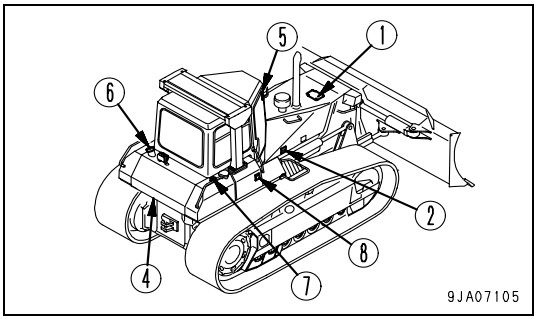
1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, also check for any leakage of oil or coolant. If any problem are found, repair them.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud affixed to the undercarriage.

LOCKING

To prevent vandalism, there are locks at the following places.

Places that can be locked with the starting switch key.





- Top cover at front of chassis (1)
- Right and left engine side covers (2)
- Battery inspection cover (3)
- Inspection cover for fuel tank drain valve(4)
- Cab door opener (5) (machines equipped with cab)
- Fuel tank filler cap (6)
- Hydraulic tank filler cap (7)
- Power train filter inspection cover (8)

TIPS FOR LONGER UNDERCARRIAGE LIFE

Undercarriage life greatly varies depending on operation method, inspection and maintenance. For most efficient operation, keep the following point in mind.

OPERATION METHOD

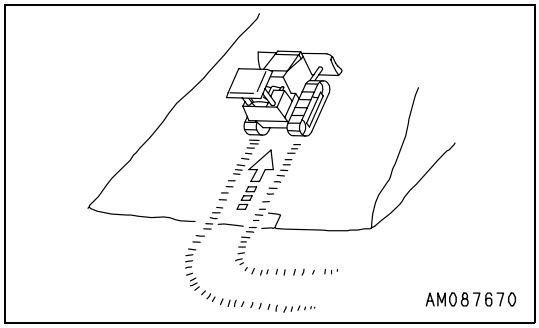
- Select the track shoe that best suits the type of soil to be encountered in service.

  Please consult your Komatsu distributor when selecting track shoes.

- Do not allow shoe slipping to occur during operation.

  If shoe slipping occurs, reduce load to the blade until slipping stops.

- Avoid sudden starts, acceleration or stops, unnecessary high speeds and sharp turns.
- Always operate machine in a straight line whenever possible. When making turns, be careful not to allow the machine to stay to one side, so operation in both turning directions can be done properly. Make turns with the largest possible radius.
- Prior to operation, clear boulders and obstacles to prevent machine from riding over them while operating.
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face toward the top of the slope.
- When ground inclines to the left or right during digging operations, do not continue to dig with the incline. Move the machine back to level ground and start to dig again.
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.



TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

TRANSPORTATION MEANS

As a rule, transport the machine on a trailer.

Select a trailer according to the mass and dimensions of the machine shown in “SPECIFICATIONS (5-2)“.

Note that the mass and dimensions for transportation shown in SPECIFICATIONS depend on the types of shoe, blade, etc.

REMOVING CAB

If it is necessary to remove the cab for transportation, there is danger that the seal may be damaged when removing or installing the cab, so please contact your Komatsu distributor.

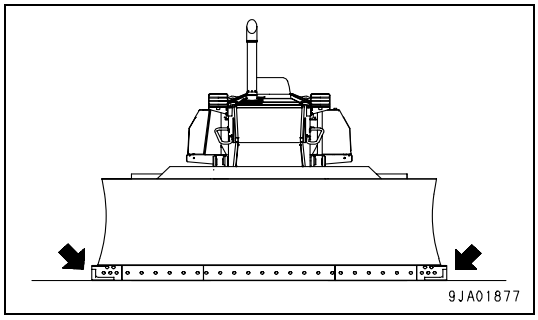
When installing the cab, please contact your Komatsu distributor, too.

PRECAUTIONS WHEN REMOVING WORK EQUIPMENT

POWER ANGLE, POWER TILTDOZER

(For D61PX)

1. Lower the blade to the ground and set it horizontal to the ground surface.
2. Remove the blade assembly.

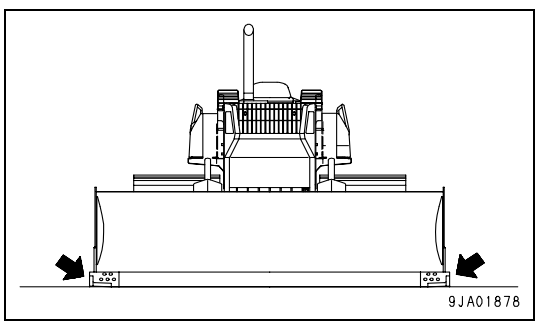


REMARK
If the blade of D61EX is angled, its width is shorted to less than 3.0 m (9 ft 10 in). Accordingly, the blade of D61EX does not need to be removed.

POWER TILTDOZER

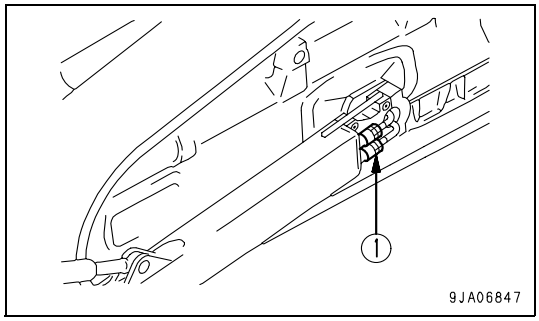
If there is any pressure remaining in the tilt piping after the work equipment has been removed, it may be difficult to remove the quick coupler of the tilt hose, so remove the work equipment as follows.

1. Lower the blade to the ground and set it horizontal to the ground surface.



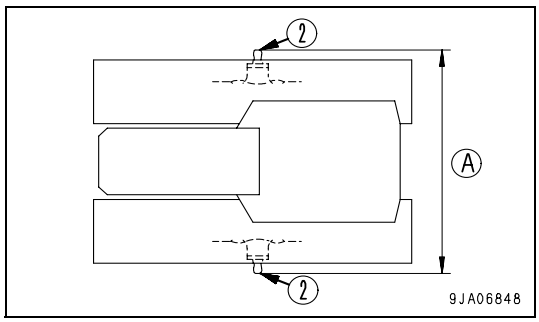
REMARK
If the blade is tiled, the tilt piping will be under internal pressure, so set the blade horizontal to the ground.

2. Remove the quick coupler (1), then remove the work equipment assembly.



3. Remove the left and right trunnions (2).

   (For D61PX)



REMARK
In the case of D61PX, remove the left and right trunnions (2).
In the case of D61EX, the width including the left and right trunnions (2) is within 3.0 m (9 ft 10 in), so there is no need to remove them.

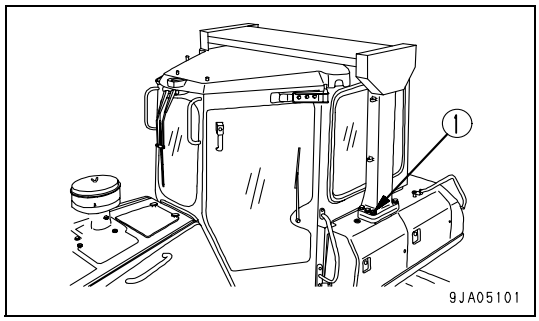
4. Tie the tilt hose with a band to prevent it from being damaged.

PRECAUTIONS WHEN REMOVING ROPS

When removing ROPS for transporting the machine, do as follows:

NOTICE
ROPS is an important safety component. Be sure to tighten mounting bolts (1) securely to the specified torque when installing.

Tightening torque: 785 to 980 N·m (80 to 100 kgf·m, 578.6 to 723.3 lbft)



1. Loosen bolts (1) and remove ROPS.

LOADING, UNLOADING WORK

⚠ WARNING

- **Since loading and unloading of the machine is dangerous, be extremely careful.**
- **When loading or unloading the machine, operate it slowly with the engine speed low and the transmission in the 1st gear.**
- **Use ramps having sufficient width, length, thickness, and strength. Install them securely and set their angle to 15° or less.**
  If the ramps are deflected appreciably, reinforce them with blocks.
- **Perform the loading work of the machine on firm, level ground. Secure sufficient distance between the shoulder of the road and the trailer.**
- **Remove mud from the undercarriage of the machine so that the machine will not slip sideways on the ramps. In addition, remove water, snow, ice, grease, oil, etc. from the ramps.**
- **Never steer the machine on the ramps, since steering on the ramps can cause the machine to tip over. If it is necessary to change the travel direction, return to the ground or to the bed of the trailer, then change the travel direction.**
- **The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.**

When loading or unloading, always use ramps or a platform. Proceed as follows.

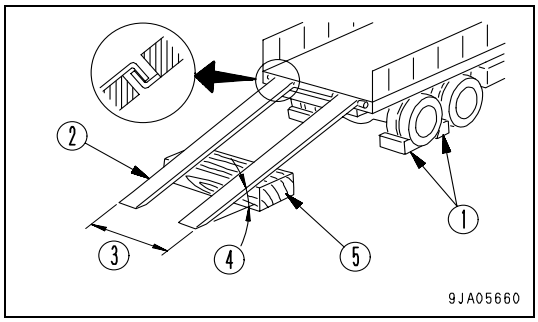
LOADING WORK

1. Load and unload on firm level ground only.

   Maintain a safe distance from the edge of a road.

2. Apply the trailer brakes securely and put blocks (1) under the tires to hold the trailer in position.Set gap (3) between ramps (2) to match the distance between the left and right tracks, and keep angle (4) to a maximum of 15°.

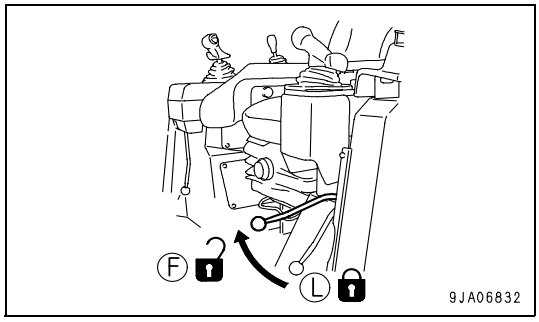
   If ramps (2) bend appreciably under the weight of the machine, put wooden block (5) under the ramps to support them.



3. Start the engine.

   In a cold weather, carry out an engine warming-up run, referring to the section, “STARTING IN COLD WEATHER (3-95)“, in this manual.

4. Set parking brake lever to the FREE position (F).
5. Set the transmission in the 1st gear and run the engine at low idle.
6. Set the travel direction toward the ramps and drive slowly.
7. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
8. Stop the machine at the specified position on the trailer.



SECURING MACHINE

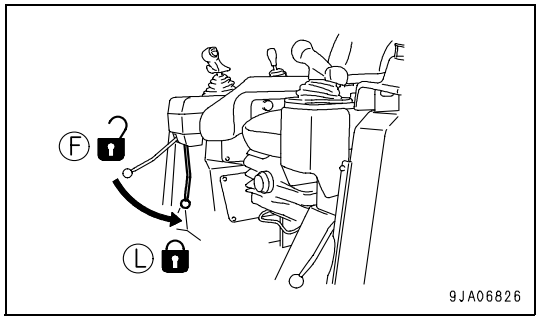
NOTICE
Always lower the car radio antenna to the stowing position and secure it in position (if the machine is equipped with a cab).

Load the machine onto a trailer as follows:

1. Lower the work equipment slowly.

   (When transporting with work equipment installed)

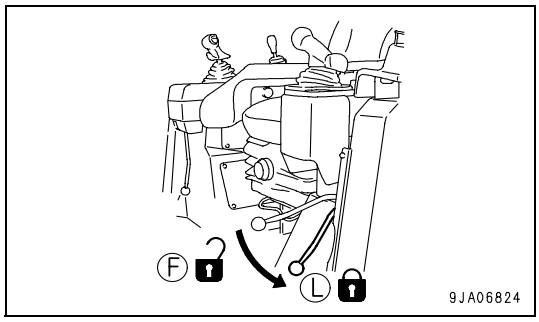
REMARK
If the edge of the blade extends outside the trailer, angle the blade to reduce the width.



2. Set the work equipment lock leve to the LOCK position (L) securely.

   (When transporting with work equipment installed)

3. Set the parking brake lever to the LOCK position (L).
4. Stop the engine, then remove the key from the starting switch.



5. Fix the machine as explained below so that it will not move during transportation.

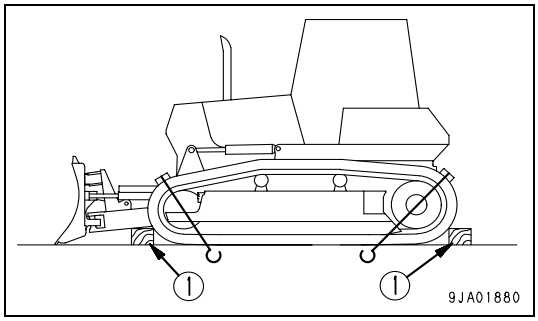
   In particular, fix the machine securely to prevent it from slipping sideways.

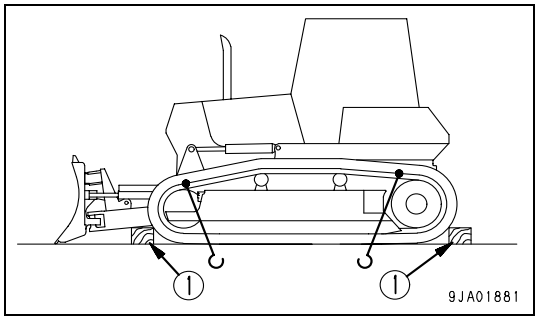
6. Put blocks (1) in front and behind the track shoes of both sides.

7. Set up chain or wire, following (A) or (B).

   - A: Secure chain or wire around the track shoes.
   - B: Secure chain or wire through the holes of track links.

8. Protect the wire from contacting directly with angular parts of the machine, by inserting pads.

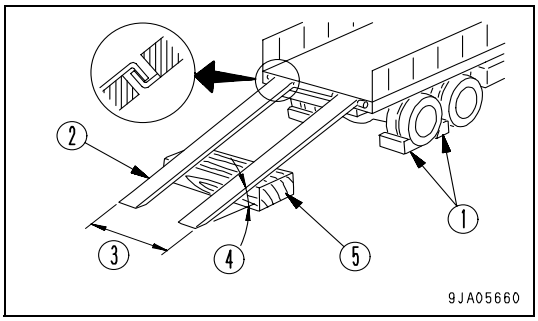




UNLOADING WORK

1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.
2. Apply the trailer brakes securely and put blocks (1) under the tires to hold the trailer in position.Set gap (3) between ramps (2) to match the distance between the left and right tracks, and keep angle (4) to a maximum of 15°.

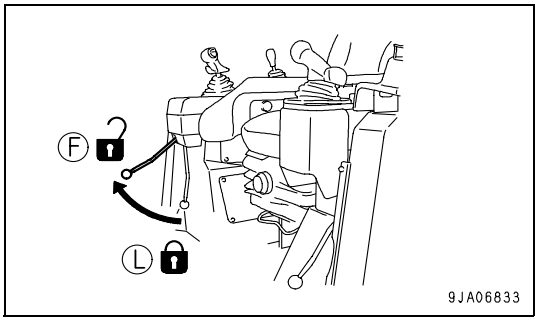
   If ramps (2) bend appreciably under the weight of the machine, put wooden block (5) under the ramps to support them.
3. Remove the chains and wire ropes fastening the machine.



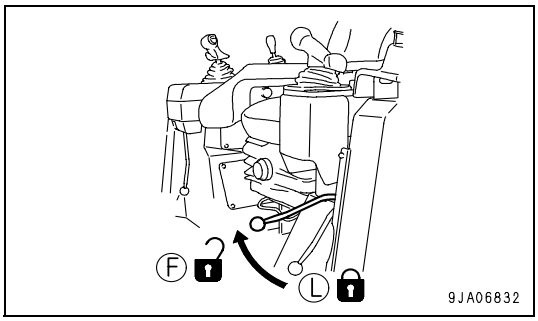
4. Start the engine.

   In a cold weather, carry out an engine warming-up run, referring to the section, “STARTING IN COLD WEATHER (3-95)“, in this manual.
5. Set main work equipment lock lever to FREE position (F), and raise the work equipment.

   (When transporting with work equipment installed)



6. Set parking brake lever to the FREE position (F).
7. Set the transmission in the 1st gear and run the engine at low idle.
8. Set the travel direction toward the ramps and drive slowly.
9. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
10. Drive down the ramps slowly and carefully until the machine leaves the ramps perfectly.



LIFTING MACHINE

⚠ WARNING

- **Do not lift the machine with any worker on it.**
- **Use wire ropes having sufficient strength for the weight of the machine.**
- **Lift the machine only in the position shown below. If it is lifted in another position, it may be unbalanced.**
- **Lift the machine level.**

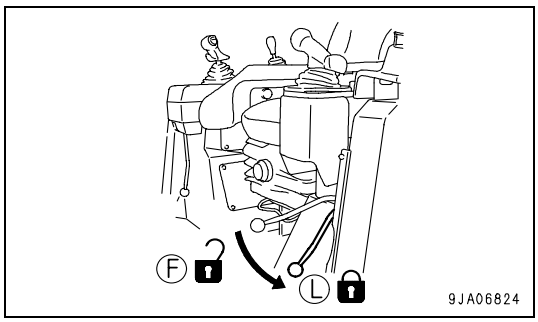
NOTICE
The lifting procedure applies to machines with standard specifications.
The method of lifting differs according to attachments and options actually installed on the machine. For the proper lifting procedures, contact your Komatsu distributor.

For details of the weight, see “SPECIFICATIONS (5-2)“.

PROCEDURE FOR LIFTING OPERATIONS

When lifting the machine, stop it on a level place, then observe the following procedure.

1. Stop the engine and set the parking brake lever to the LOCK position (L).



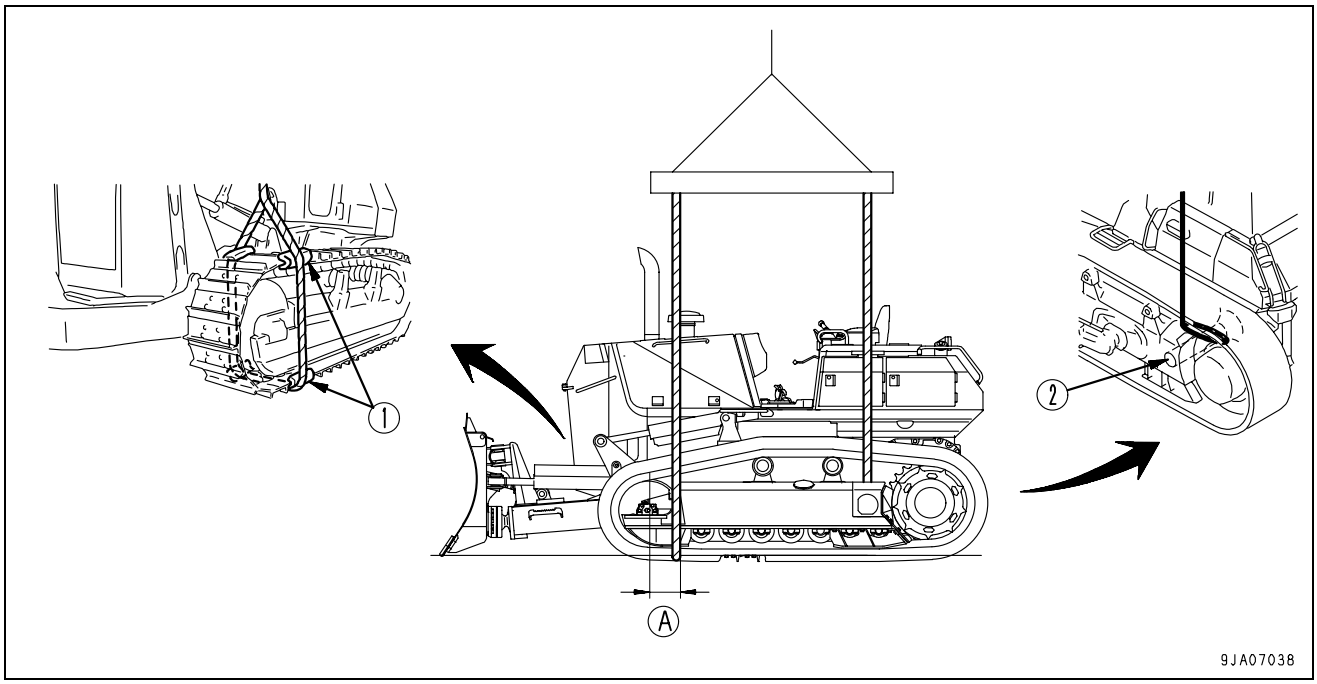
2. Install wire ropes, slings, etc. matched to the weight of the machine to the lifting points as.

NOTICE
- **Use protectors, etc. so that the wire ropes will not be broken at sharp edges or narrow places.**
- **Use spreaders and bars having sufficient width so that they will not touch the machine.**

3. After setting the wire ropes, lift up the machine and stop at 100 to 200 mm (3.9 to 7.9 in) above the ground, and check that the wire ropes are not slack and the machine is level, then lift up slowly.

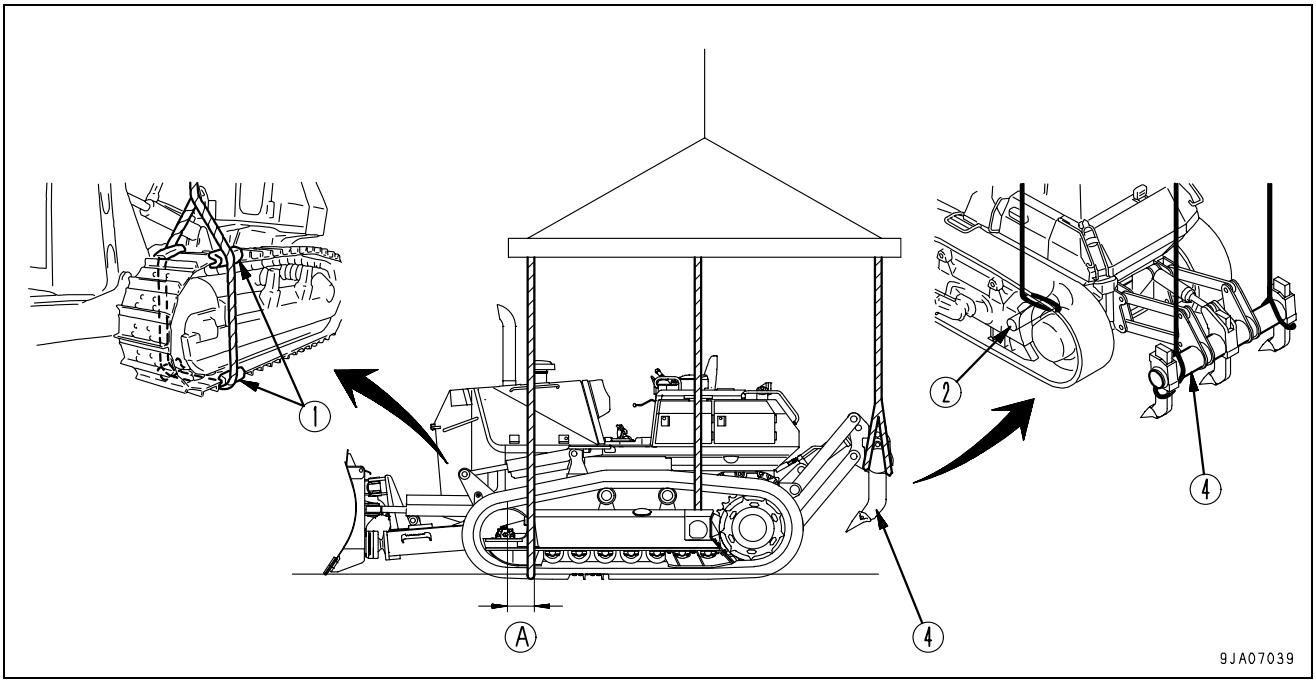
LIFTING POSITION

(For D61EX)



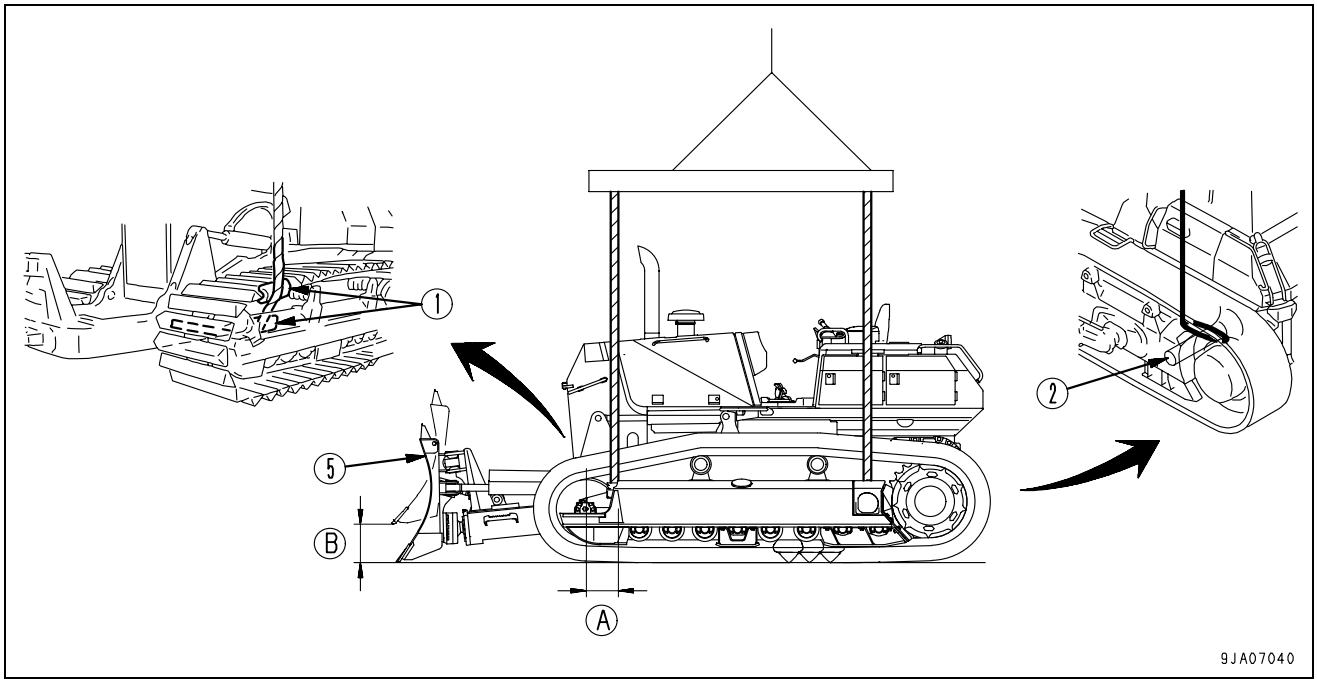
- Fit the wire rope at the front to the track shoe within range (A) between the center of the front idler and the rear edge.
- Fit the wire ropes at the front to both the left and right track shoes.
- Fit protector (1) at the edge to protect the wire rope.
- Fit the wire ropes at the rear to both left and the right pivot shafts (2).

For machine equipped with ripper



- Raise ripper (3) to the maximum height and retract the ripper cylinder fully.
- Fit the wire rope at the front to the track shoe within range (A) between the center of the front idler and the rear edge.
- Fit the wire ropes at the front to both the left and right track shoes.
- Fit protector (1) at the edge to protect the wire rope.
- Fit the wire ropes at the center to both left and the right pivot shafts (2).
- Fit the wire rope at the rear to ripper beam (4).

(For D61PX)



- Raise blade (5) height (B) 30 - 40 cm (1.2 - 1.6 in) from the ground.
- Pass the wire rope at the front within the range (A) between the center of the front idler and the rear edge, pass it under the undercover, and bring it out to the opposite side.
- Fit protector (1) at the edge to protect the wire rope.
- Fit the wire ropes at the rear to both left and the right pivot shafts (2).

COLD WEATHER OPERATION

PRECAUTIONS FOR LOW TEMPERATURE

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 the fuel and oil for each component to those of lower viscosity. For the specific viscosity, see “USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (4-10)“.

COOLANT

⚠ WARNING

- **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 amounts of fresh water and see a doctor at once.**
- **When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact your Komatsu distributor. Antifreeze is toxic. Do not let it flow into drainage ditches or spray it on to the ground surface.**
- **Antifreeze is flammable. Do not bring any flame close. Do not smoke when handling antifreeze.**

NOTICE

- **Never use methanol, ethanol, or propanol-based antifreeze.**
- **Never use any water-leakage prevention agent or any antifreeze containing such an agent.**
- **Do not mix different types of antifreeze.**

For details on the amount of antifreeze mixture and on when to change the coolant, see “CLEAN INSIDE OF COOLING SYSTEM (4-23)“.

Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, antifoam agent, etc.) meeting the standard requirements as shown below. With permanent antifreeze, no change of coolant is required for a year. If it is doubtful that an available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.

Standard requirements for permanent antifreeze

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

REMARK

In areas where permanent antifreeze is not available, it is possible to use antifreeze whose main component is ethylene glycol and does not contain any corrosion inhibitor. (Such antifreeze can be used for the winter season only.) However, in such a case, the coolant must be changed twice a year (spring and autumn), so use permanent antifreeze when possible.

BATTERY

⚠ WARNING

- **The battery generates flammable gas. 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.**
- **Battery electrolyte dissolves paint. If it gets on the bodywork, wash it off immediately with water.**
- **If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.**
- **Battery electrolyte is toxic. Do not let it flow into drainage ditches or spray it on to the ground surface.**

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%. Insulate it against cold temperature to ensure the machine can be started easily the next morning.

REMARK
Measure the specific gravity and calculate the rate of charge from the following conversion table.

Temperature(°C) Charging Rate (%)	20	0	-10	-20
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

- As the battery capacity drastically drops in low temperatures, cover or remove the battery from the machine, store the battery in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add water after the day's work to prevent diluted electrolyte in the battery from freezing during the night.

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. 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 tracks from being frozen in the soil and allow the machine can be moved the next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to capacity. This minimizes moisture condensation in the tank when the temperature drops.

AFTER COLD WEATHER

When the season changes and the weather becomes warmer, do as follows.

- Replace all fuel and oil with the specified fuel and oil.

  For details, see “USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (4-10)“.
- If for any reason permanent antifreeze cannot be used, and an ethylene glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely. Thoroughly flush out the cooling system and fill it with fresh coolant.

LONG-TERM STORAGE

BEFORE STORAGE

When keeping in long-term storage (more than one month), store 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 with a sheet.
- Fill the fuel tank to prevent moisture from accumulating.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Place all control levers in the neutral position, set the work equipment lock lever and parking brake lever in the LOCK position, and set the fuel control lever to the low idle position.

DURING STORAGE

⚠ WARNING

When it is necessary to perform the rust-preventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- During storage, operate and move the machine for a short distance once a month so a new film of oil will coat movable parts and component surfaces. At the same time, also charge the battery.
- When operating the work equipment, wipe off all the grease from hydraulic cylinder rods.
- 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

NOTICE
If the machine has been stored without the monthly rust prevention operation, consult your Komatsu distributor for service.

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 at all lubrication points.
- When the machine is stored for a long period, moisture in the air can contaminate the oil over time. Check the oil for presence of water before and after starting the engine. If there is water in the oil, change the oil.

TROUBLESHOOTING

AFTER RUNNING OUT OF FUEL

When restarting the machine after running out of fuel, fill with fuel and bleed the air from the fuel system before starting.

For details of bleeding the air, see “REPLACE FUEL FILTER CARTRIDGE (4-55)“.

MACHINE TOWING METHOD

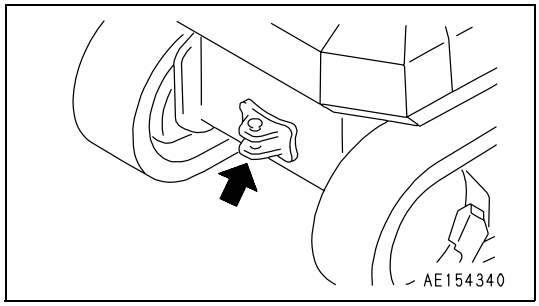
⚠ WARNING

- **If the engine does not start, put blocks under the tracks to prevent the machine from moving, then release the brake. If blocks are not put under the tracks, the machine may suddenly move.**
- **Be sure to use a wire rope sufficiently strong for the towing weight.**
- **When using the towing hook, be sure to use a shackle.**
- **Set the wire rope horizontally and align it with the track frame.**
- **Tow the machine slowly.**
- **When returning a towed machine to the jobsite, first check that the necessary repairs and adjustments have been made.**

For details of the method of towing, please contact your Komatsu distributor.

- With this machine, if the engine stops or there is an problem in the hydraulic system and the oil pressure in the brake circuit drops, the brake is actuated and it becomes impossible to move the machine. To move the machine, it is necessary to use a special device to set the oil pressure in the brake circuit to above the specified pressure, so see the section “WHEN ENGINE DOES NOT START (3-134)“ to release the brake, or contact your Komatsu distributor.
- Moving a machine by towing is only used to move it to a place where it is possible to carry out inspection and maintenance. It is not intended for moving the machine long distances. Do not use this method for towing the machine for long distances.
- Before towing, check that the tow rope or bar are in good condition, and that they have ample strength for the towing operation. If the machine being towed may get stuck in mud or may have to be towed uphill, the tow rope or bar must be of a strength of at least 1.5 times greater than the weight of the machine being towed.
- If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.
- To protect the operator if the towing rope or bar should break, fit a shield to the machine being towed.
- When towing a machine, travel slowly. If the machine is suddenly pulled, the towing rope may break. Before starting to move the towed machine, remove any slack in the rope, and keep the rope taut during the towing operation.
- Keep the angle of the towing line to the minimum. Operate the machine so that the angle does not become greater than 30° from the straight line.

If the machine gets stuck in the mud or a heavy thing needs to be towed, install a towing wire rope to the draw bar pin.



WHEN IT IS POSSIBLE TO START ENGINE

⚠ CAUTION

The operator of the machine being towed should always operate the steering so that the machine faces in the direction of the towing line.

NOTICE
The maximum towing capacity for this machine is 14,275 kg (140,000 N). Always carry out towing operations within the maximum towing capacity.

If the steering or brake system are actuated and the engine is running, it is possible to pull the machine out of mud, move it to the side of the road, or tow it for short distances.

Always read the section “MACHINE TOWING METHOD (3-132)“ and carry out the operation extremely carefully.

WHEN ENGINE DOES NOT START

⚠ WARNING

- **If action has been taken to release the brakes, the brakes cannot be used, so never let anyone travel on the machine when it is being towed.**
- **When towing a machine downhill, connect another machine behind the machine being towed and use the brakes on this machine to control the braking.**
- **When carrying out the towing operation, do not let any person enter the area around the machine being towed.**

If the engine does not work and the machine is to be moved, it is necessary to carry out preparatory work to install a pump to release the brakes.

For details of the equipment needed to tow a machine when the engine does not work, please contact your Komatsu distributor.

To release the brakes, install a brake release pump on the machine to be towed and connect the hose at the pressure side of the pump to the brake. Use the pressure of the pump to apply pressure to the brake and release the brake. For details, see the next page. Follow the procedure and carry out the operation correctly.

CONNECTING BRAKE RELEASE PUMP

It is possible to use a service hydraulic pump to release the brakes on the problem machine and tow it.

- Part number of hydraulic pump: 790-190-2000

Main specifications of hydraulic pump

Discharge amount: 6.8 liters/minute 3.9MPa(40kg/cm2)

Discharge pressure: 13.7MPa(140kg/cm2)

Tank capacity: 20 liters (5.28 US gal)

Rated horsepower: DC24V 750W

Oil used: SAE10W

Weight: 9.5 kg (20.95 lb)

Hose length: 1.5 m (59.1 in)

PUMP TEST

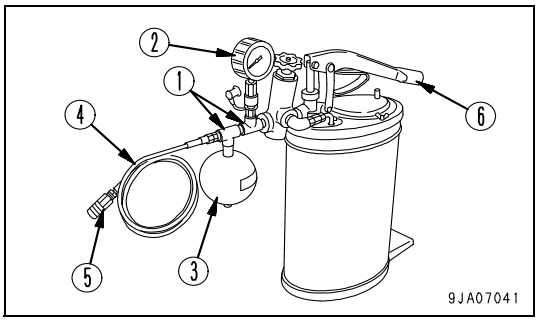
⚠ CAUTION

If the operation is carried out without inspecting the hydraulic pump, it may lead to damage of the brake system seal. Always inspect the hydraulic pump before connecting it.

1. Install tee (1) to the discharge portion of the pump, then install oil pressure gauge (2) and accumlator (3), rubber hose (4).

   Install quick coupler (5) to the end of rubber hose (6) that is mounted to the machine.

2. Pump handle (6) and check that the pressure gauge becomes 2.7 to 3.1 MPa (28 to 32 kg/cm2, 298 to 454 PSI).

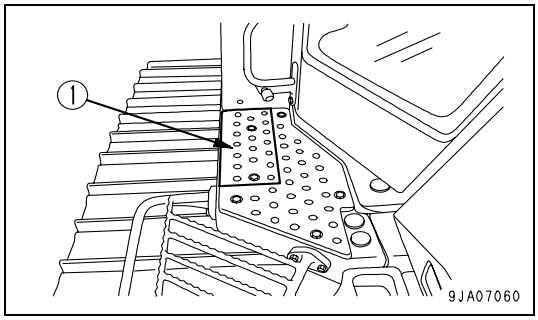


CONNECTING PUMP TO MACHINE

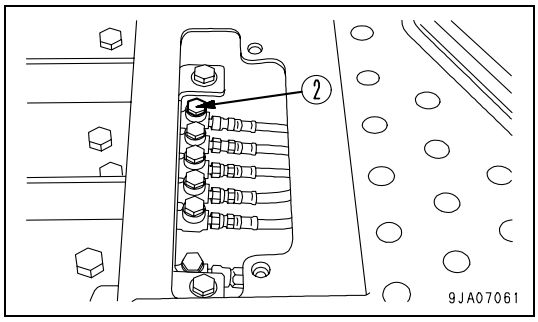
⚠ WARNING

- **Fit blocks under the tracks to prevent the machine from moving, then release the brake.**
- **Immediately after the engine is stopped, all parts are at high temperature, so do not carry out the operation to install the brake release pump immediately. Wait for the temperature to go down until it is possible to touch the steering case by hand.**

1. Fit blocks securely under the tracks to prevent the machine from moving.
2. Remove cover (1) of the central pressure detection port in the right fender.

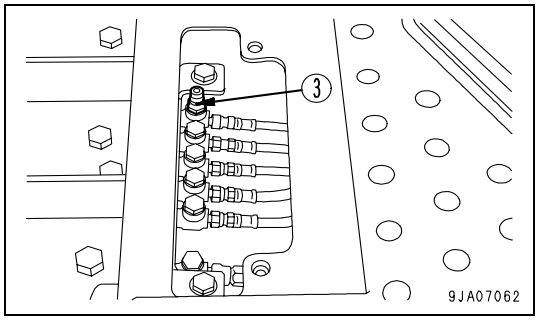


3. Remove plug (2) from the brake pressure detection port.



4. After removing the plug, install adapter (3).

   Install an adapter that fits the mouthpiece of the brake release pump.
5. Connect the hose of the brake release pump to adapter (3) in the brake pressure detection port.



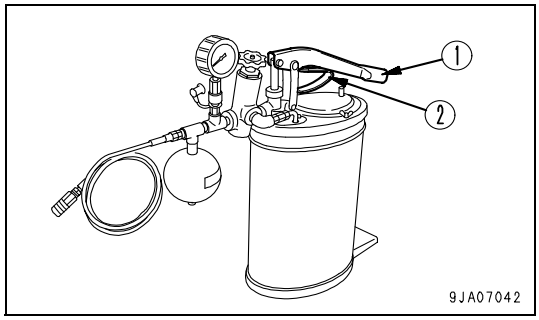
RELEASING BRAKE

⚠ CAUTION

When a machine is towed, the brakes must be fully released. If the brakes are partially applied, this may lead to overheating and damage to the brakes.
To release the brakes, set the pump pressure to 2.7 to 3.1 MPa (28 to 32 kg/cm2, 398 to 454 PSI).
If the pump pressure exceeds 3.1 MPa (32 kg/cm2, 454 PSI), the components of the brake may be damaged.
When towing, leakage from the oil pressure circuit will cause the pump pressure to go down with time. Always keep the pump pressure above 1.8 MPa (18 kg/cm2, 213 PSI) when towing. If the pressure goes below 1.8 MPa (18 kg/cm2, 213 PSI) during the towing
operation, stop the operation, pump the handle of the brake release pump, and raise the pump pressure to 2.7 to 3.1 MPa (28 to 32 kg/cm2, 398 to 454 PSI).
When towing, do not use the brakes to control the travel speed of the machine. This will further damage the brakes and there may be defective operation of the brake system.

1. Operate handle (1) of the brake release pump and send pressure oil to the brake circuit until it reaches the specified pressure.

   Specified pump pressure: 2.75 to 3.14 MPa (28.0 to 32.0 kg/cm2, 398 to 454 PSI)



REMARK
If it is necessary to move the brake release pump during the operation, hold lever (2) under handle (1) and move the pump.

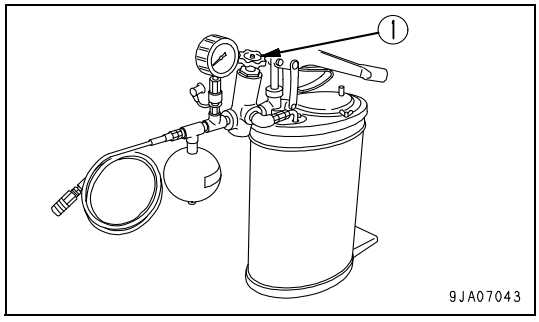
2. It is now possible to tow the machine.

   Remove the blocks, and tow the machine at a speed of less than 2 km/h (1.2 MPH).

OPERATING BRAKE

After completion of the towing operation, apply the brake to prevent the machine from moving.

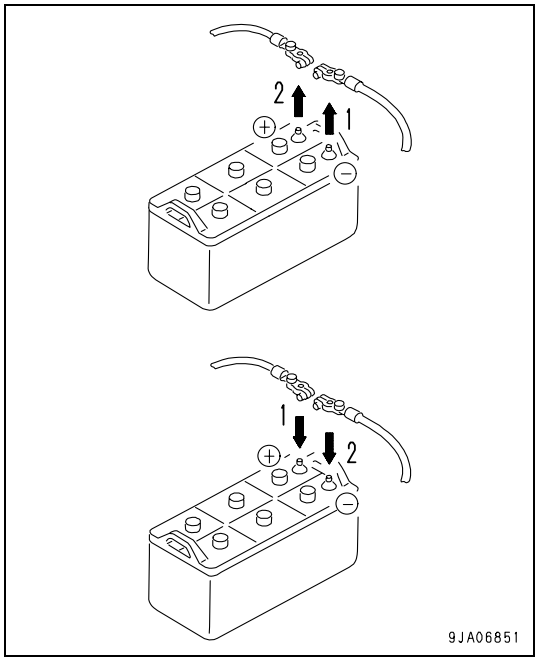
To apply the brake, turn relief handle (1) of the brake release pump to release the pressure.



IF BATTERY IS DISCHARGED

⚠ WARNING

- **It is dangerous to charge a battery when mounted on a machine. Make sure that it is dismounted before charging.**
- **When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.**
- **The battery generates hydrogen gas, so 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.**



REMOVE AND INSTALL BATTERY

1. Open the battery cover.
2. Before removing battery, remove the ground cable (normally connected to the negetive (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nuts of the terminal and remove the wires from the battery.
3. After installing the battery, fix it with the battery hold down.

   Tightening torque: 1.47 to 1.96 N·m (0.15 to 0.2 kgf·m, 1.1 to 1.4 lbft)
4. When installing the battery, connect the ground cable last.

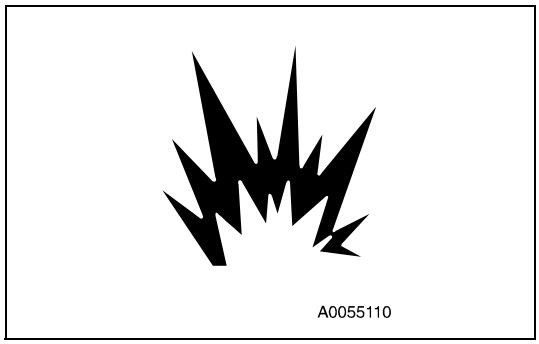
   Insert the hole of the terminal on the battery and tighten the nut.

   Tightening torque: 5.9 to 9.8 N·m

   (0.6 to 1.0 kgf·m, 4.3 to 7.2 lbft)

PRECAUTIONS FOR BATTERY CHARGING

If the battery is charged improperly, it may explode. Accordingly, charge it according to “IF BATTERY IS DISCHARGED (3-138)“ and the instruction manual attached to the charger, and observe the following items.



- Set the voltage of the charger to match the voltage of the battery to be charged. If the correct voltage is not selected, 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 fix 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 leak 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 danger that this will ignite the battery electrolyte and cause the battery to explode.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.

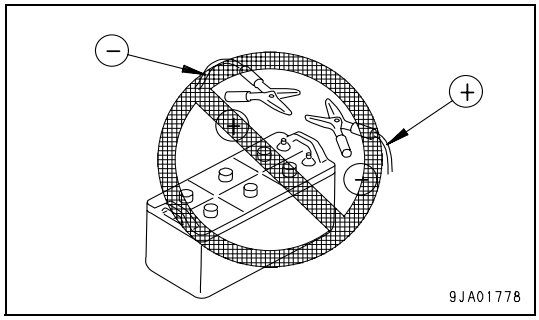
STARTING ENGINE WITH BOOSTER CABLE

When starting the engine with a booster cable, do as follows:

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

- **When connecting the cables, never contact the positive (+) and negative (-) terminals.**
- **When starting the engine with a booster cable, 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.**



NOTICE

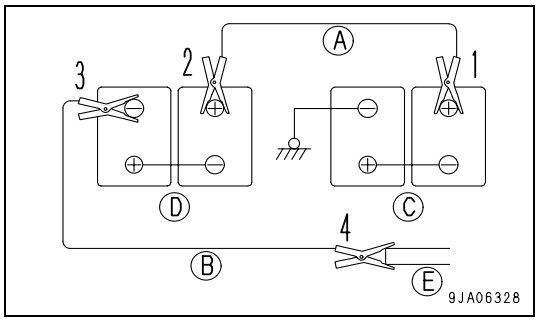
- **The starting system for this machine uses 24V. For the normal machine, also use a 24V battery.**
- **The size of the booster cable and clip should be suitable for the battry size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**
- **Check that the work equipment lock levers and parking brake levers of both machine are in the LOCK position.**
- **Check that each lever is in the NEUTRAL position.**

CONNECTING THE BOOSTER CABLE

Keep the starting 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 the clip of booster cable (A) to the positive (+) terminal of battery (C) on the problem machine.
2. Connect the clip at the other end of booster cable (A) to the positive (+) terminal of battery (D) on the normal machine.
3. Connect the clip of booster cable (B) to the negative (-) terminal of battery (D) on the normal machine.
4. Connect the clip at the other end of booster cable (B) to engine block (E) on the problem machine.



STARTING ENGINE

⚠ WARNING

Always check that the work equipment lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are in the HOLD or NEUTRAL position.

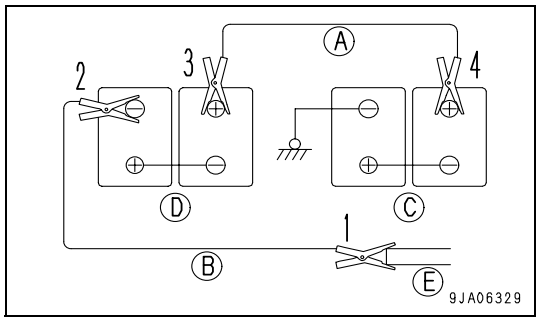
1. Make sure the clips are firmly connected to the battery terminals.
2. Start engine of the normal machine and run it at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine.

   If the engine doesn't start at first, try again after 2 minutes or so.

DISCONNECTING THE BOOSTER CABLE

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

1. Remove the clip of booster cable (B) from engine block (E) on the problem machine.
2. Remove the clip of booster cable (B) from the negative (-) terminal of battery (D) on the normal machine.
3. Remove the clip of booster cable (A) from the positive (+) terminal of battery (D) on the normal machine.
4. Remove the clip of booster cable (A) from the positive (+) terminal of battery (C) on the problem machine.



OTHER TROUBLE

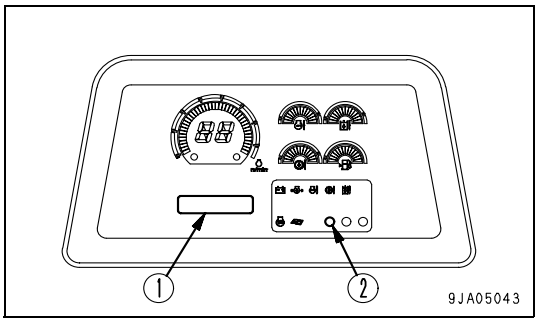
ELECTRICAL SYSTEM

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problem or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main cause	Remedy
Lamp does not glow brightly even when the engine runs at high speed	•Defective wiring	(•Check, repair loose terminals, disconnections Check fuses and diodes in fuse box)
Lamp flickers while engine is running	•Defective adjustment of fan belt tension	•Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Battery charge circut caution lamp dose not go out even when engine is running	•Defective°belt •Defective alternator •Defective wiring	•Replace (•Replace) (•Check, repair Check fuse, diode in fuse box)
Abnormal noise is generated from alternator	•Defective alternator	(•Replace)
Starting motor does not turn when starting switch is turned to ON	•Defective wiring •Insufficient battery charge	(•Check, repair) •Charge
Pinion of starting motor keeps going in and out	•Insufficient battery charge	•Charge
Starting motor turns engine sluggishly	•Insufficient battery charge •Defective starting motor	•Charge (•Replace)
Starting motor disengages before engine starts	•Defective wiring •Insufficient battery charge	(•Check, repair) •Charge
Engine preheating pilot lamp does not light up (When the temperature of the engine coolant exceed 20°C (68°F), this condition is normal)	•Defective wiring •Defective timer •Defective monitor •Disconnection in glow plug	(•Check, repair) (•Replace) (•Replace) (•Replace)
Air conditioner operation is defective	•Blown fuse •Insufficient battery charge •Defective air conditioner switch •Defective blower switch •Defective compressor	(•Check, repair) •Charge (•Replace air conditioner switch) (•Replace blower switch) (•Replace)

MONITOR PANEL

When an error code appears on the display panel B (multi-information), take appropriate remedies based upon the table below.



(1): Display panel B

(2): Warning lamp (red)

REMARK
If different kinds of failures occur at the same time, their failure codes are arranged in the order of seriousness in the display. The order of seriousness in this case is E04, E03, E02 and E01, starting from the most serious one.

Action code	Display panel B	Warning lamp	Alarm buzzer	Remedy
E01	Top line: Displays E01 Bottom line: Displays service meter	-	-	Failure in part of function, stops. When continuing operations, be extremely careful of location of failure. After completing operations, contact Komatsu distributor for repairs
E02	Top line: Displays E02 Bottom line: Displays service meter	Flashes	Sounds	Serious failure in part of function, stops. When continuing operations, be extremely careful of location of failure. After completing operations, contact Komatsu distributor for repairs
E03	Top line: Displays E03 Bottom line: Displays telephone number (If no telephone number is set, displays 0)	Flashes	Sounds	After moving to safe place, stop machine immediately. Contact Komatsu distributor for repairs
E04	Top line: Displays E04 Bottom line: Displays telephone number (If no telephone number is set, displays 0)	Flashes	Sounds	Stop machine immediately. Contact Komatsu distributor for repairs

Note: If an abnormality display appears on display panel B, check the fault code. For details, see “METHOD OF USING FAULT CODE DISPLAY MODE (3-29)“.

When contacting your Komatsu distributor, please give the fault code also.

CHASSIS

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problem or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Oil pressure in torque converter fails to rise	•Improper tightening of oil pipe, pipe joint, air leaking in or oil leaking out because of damage •Wear, scuffing of gear pump •Insufficient oil in power train case •Clogged oil filter element strainer in power train case	•Check, repair (•Check, replace) •Add oil to the specified level. For details, see CHECK BEFORE STARTING •Clean. For details, see EVERY 500 HOURS SERVICE
Torque converter is overheated	•Clogged radiator •Engine coolant temperature is high •Clogged oil cooler •Oil pressure too low •Lack of flow of lubricant caused by wear of power train gear pump	•Clean radiator core •See ENGINE related parts (•Clean or repalce) •Go to “Oil pressure in torque converter fails to rise“ (•Replace gear pump)
Torque converter oil temperature gauge does not work	•Defective oil temperature gauge •Defective contact in wiring connection	(•Replace oil temperature gauge) (•Check, repair)
Lacks drawbar pull (machine does not pick up speed)	•Lack of engine horsepower •Oil pressure in torque converter is too low	•See ENGINE related parts •Go to “ Oil pressure in torque converter fails to rise“
Machine will not move when steering, forward-reverse, gear shift lever is placed in FORWARD	•Insufficient oil in power train case •Transmission oil pressure does not rise •Defective Brake •Defective lever wiring •Parking brake lever is in LOCK position	•Add oil to specified level. For details, see CHECK BEFORE STARTING •Go to oil pressure in torque converter fails to rise (•Adjust linkage) (•Check, repair) •Set to FREE position
Does not steer even when steering is operated	•Defective lever wiring •Abnormal HSS pump •Abnormal HSS motor	(•Check, repair) (•Check, replace) (•Check, replace)
Machine doesn't stop when brake pedal are depressed	•Defective brake adjustment	(•Adjust linkage) (•Check brake pressure)
Track comes off	•Track is too loose	•Adjust track tension. For details, see WHEN REQUIRED
Sprocket develops abnormal wear	•Track is too loose or too tight	•Adjust track tension. For details, see WHEN REQUIRED
Machine does not travel in straight line	•Defective adjustment of HSS controller •Abnormal HSS pump	(•Adjust) (•Replace)
Blade rises too slowly or does not rise at all (or blade tilts too slowly)	•Lack of hydraulic oil •Defective hydraulic pump •Work equipment lock lever is in LOCK position	•Add oil to specified level. For details, see EVERY 250 HOURS SERVICE •Check •Set to FREE position

ENGINE

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problem or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure caution lamp flashes when engine speed is raised after completion of warm-up	•Engine oil pan oil level is low (sucking in air) •Clogged oil filter cartridge •Defective tightening of oil pipe joint, oil leakage from damaged part •Defective monitor panel	•Add oil to specified level, see CHECK BEFORE STARTING •Replace cartridge, see EVERY 500 HOURS SERVICE (•Check, repair) (•Replace)
Steam is emitted from top part of radiator (pressure valve)	•Coolant level low, water leakage •Dirt or scale accumulated in cooling system •Clogged radiator fins or damaged fins •Defective thermostat •Loose radiator filler cap (high altitude operation) •Defective monitor panel	•Add coolant, repair, see CHECK BEFORE STARTING •Change coolant, clean inside of cooling system, see WHEN REQUIRED •Clean or repair, see WHEN REQUIRED (•Replace thermostat) •Tighten cap or replace packing (•Replace)
Engine coolant temperature caution lamp flashes		
Engine does not start when starting motor is turned	•Lack of fuel •Air in fuel system •No fuel in fuel filter •Starting motor cranks engine sluggishly •Defective valve compression	•Add fuel, see CHECK BEFORE STARTING •Repair place where air is sucked in (•Replace pump or nozzle) •See ELECTRICAL SYSTEM (•Adjust valve clearance)
Exhaust gas is white or blue	•Too much oil in oil pan •Improper fuel	•Add oil to specified level, see CHECK BEFORE STARTING •Change to specified fuel
Exhaust gas occasionally turns black	•Clogged air cleaner element •Defective nozzle •Defective compression •Defective turbocharger	•Clean or replace, see WHEN REQUIRED (•Replace nozzle) (•Adjust valve clearance) (•Clean or replace, turbocharger)
Combustion noise occasionally makes breathing sound	•Defective nozzle •Lack of fuel (in Air)	(•Replace nozzle) •Add fuel
Abnormal noise generated (combustion or mechanical)	•Low grade fuel being used •Overheating •Damage inside muffler •Excessive valve clearance	•Change to specified fuel •See item “Indicator of water temperature gauge is in red range on right side of gauge“. (•Replace muffler) (•Adjust valve clearance)

MAINTENANCE

⚠ WARNING

Please read and make sure that you understand the SAFETY section before reading this section.

GUIDE TO MAINTENANCE

Do not perform any inspection and maintenance operation that is not found in this manual.

CHECK SERVICE METER:

Check the service meter reading every day to see if the time has come for any necessary maintenance to be performed.

KOMATSU GENUINE REPLACEMENT PARTS:

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

KOMATSU GENUINE OILS:

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

ALWAYS USE CLEAN WASHER FLUID:

Use automobile window washer fluid, and be careful not to let any dirt get into it.

CLEAN OIL AND GREASE:

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

CHECKING FOREIGN MATERIALS IN DRAINED OIL:

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantity of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

FUEL STRAINER:

Do not remove the strainer from the filler port when adding fuel.

WELDING INSTRUCTIONS:

- Turn off the engine starting switch.
- Do not apply more than 200 V continuously.
- Connect grounding cable within 1 m (3.3 ft) of the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may malfunction.
- If a seal or bearing happens to come between the part being welded and grounding point, change the grounding point to avoid such parts.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

DO NOT DROP THINGS INSIDE MACHINE:

- When opening inspection windows or the oil filler port of the tank to carry out inspection, be careful not to drop nuts, bolts, or tools inside the machine.

  If such things are dropped inside the machine, it may cause damage and/or malfunction of the machine, and will lead to failure. If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

DUSTY WORKSITES:

When working at dusty worksites, do as follows:

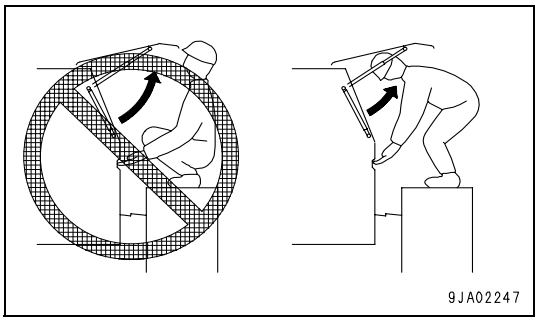
- Inspect the dust indicator frequently to see if the air cleaner is dirty or clogged.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

AVOID MIXING OILS:

If a different brand or grade of oil has to be added, drain the old oil and replace all the oil with the new brand or grade of oil. Never mix different brand or grade of oil.

PRECAUTIONS FOR OPENING AND CLOSING ENGINE SIDE COVER:

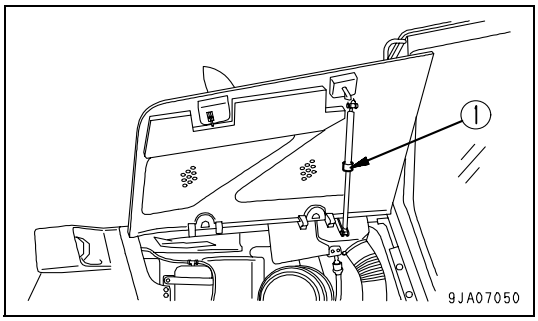
- Open the engine side cover all the way and ensure that it is locked open before letting go.
- When standing on the track to open the engine side cover, bend at the knees and open the cover in a standing position to avoid back strain.



- Before opening the cab door, always close the engine side cover.

  If the lock for the engine side cover is not released, it will not close. If any attempt is made to close it without releasing the lock, the gas damper may break.

  When closing the cover, push the orange button in the center of the gas damper (1) to release the lock, then close the cover.



LOCKING THE INSPECTION COVER:

Lock inspection cover securely into position with the lock bar. If inspection or maintenance is performed with inspection cover not locked in position, there is a danger that it may be suddenly blown shut by the wind and cause injury to the worker.

HYDRAULIC SYSTEM-AIR BLEEDING:

After repairing or replacing hydraulic equipment or after removing the hydraulic piping, it is necessary to bleed the air from the circuit. For details, see “PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (4-42)“.

PRECAUTIONS WHEN INSTALLING HYDRAULIC HOSES:

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.

  When doing this, be careful not to forget to assemble the O-rings and gaskets.

- When installing the hoses, do not twist or bend them into loops with a small radius.

  This will cause damage to the hose and drastically reduce its service life.

CHECKS AFTER INSPECTION AND MAINTENANCE WORK:

If you forget to perform the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do the following:

- Checks after operation (with engine stopped)
  - Have any inspection and maintenance points been forgotten?
  - Have all inspection and maintenance items been performed correctly?
  - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
  - Is there any leakage of coolant or oil? Have all nuts and bolts been tightened?
- Checks when engine is running
  - For the checks when the engine is running, see “TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (2-28)“ in the SAFETY section, and take care of safety sufficiently.
  - Check that the inspected and maintained parts work normally.
  - Raise the engine speed and check for fuel leakage and oil leakage.

OUTLINE OF SERVICE

OUTLINE OF OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

OIL

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure), and deteriorates with use.

  Always use oil that matches the grade and maximum and minimum ambient temperatures recommended in the Operation and Maintenance Manual. Even if the oil is not dirty, always change the oil after the specified interval.

- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.

  The majority of problems with machines are caused by the entry of such impurities.

  Take particular care not to let any impurities get in when storing or adding oil.

- Never mix oils of different grades or brands.

- Always add the specified amount of oil.

  Having too much oil or too little oil are both causes of problems.

- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.

- When changing the oil, always replace the related filters at the same time.

- We recommend you have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.

FUEL

- After completing the day's operations, fill the fuel tank to force out any air containing moisture. This will prevent the moisture from condensing and mixing with the fuel.

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.

- Be extremely careful not to let impurities get in when storing or adding fuel.

- Always use the fuel specified in the Operation and Maintenance Manual.

  Fuel may congeal depending on the temperature when it is used (particularly in low temperature below -15°C (5°F)). It is necessary to use the fuel that is suitable for the temperature.

- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.

- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

COOLANT

- River water contains large amount of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.

  Do not use water that is not suitable for drinking.

- When using antifreeze, always observe the precautions given in the Operation and Maintenance Manual.
- Antifreeze is also effective in preventing corrosion on the parts of the engine cooling system. It may be continuously used for two years or 4000 hours of operation, therefore it may be used throughout the year.
- Antifreeze is flammable, so be extremely careful not to expose it to flame or fire.
- The proper mixing proportion of the antifreeze depends on the ambient temperature. For the mixing proportion, see “CLEAN INSIDE OF COOLING SYSTEM (4-23)“.
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they do not need grease.

  If any part becomes stiff after being used for long time, add grease.

- Always wipe off all of the old grease that is pushed out when greasing.

  Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

The oil clinic samples the oil periodically and analyzes it. This is a preventive maintenance service, which provides early discovery of abnormal parts and wear of the drive parts of the machine. This then makes it possible to ensure prevention of failures and reduction in downtime.

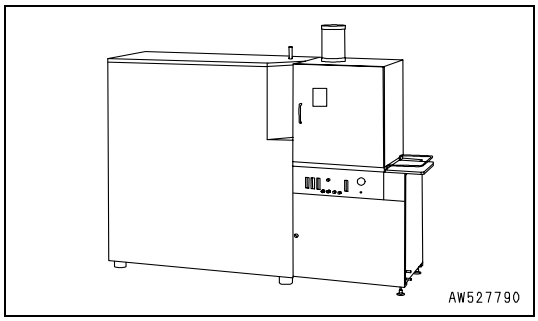
Komatsu's long years of experience and rich supply of accumulated data make it possible to accurately determine the condition of your machine. This enables us to locate the problems and to recommend suitable and timely repair methods.

The oil clinic charges the customer only the actual costs, and provides an immediate report of the results of the analysis and recommendations for action to take. This low-cost service can save you high costs and inconvenience in the future, so we strongly recommend you to avail yourself of this service.

KOWA ANALYSIS ITEMS

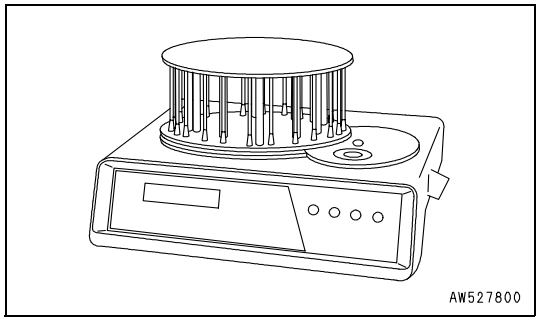
- Analysis of metal wear particles

  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) machine 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.
  - Perform sampling at regular fixed intervals.
  - Do not perform sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

STORING OIL AND FUEL

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drums is at the side to prevent moisture from being sucked in.

  If drums have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.

  Replace all filters periodically. For details, see the Operation and Maintenance Manual.

  However, when working in severe conditions, replace the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are affixed to the old filter. If any metal particles are found, contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

RELATING TO ELECTRIC SYSTEM

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause an electrical short circuit and may lead to malfunction of the machine. Do not wash the inside of the operator's cab with water. When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system is checking fan belt tension, checking damage or wear to the fan belt and checking battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electro-magnetic interference may cause malfunction of the control system controller, so before installing a radio receiver or other wireless equipment, contact your Komatsu distributor.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- When installing electrical equipment, connect it to the special power source connector.

  Do not connect the optional power source to the fuse, starting switch, or battery relay.

WEAR PARTS LIST

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 distributor of the machine serial number and check for the latest part number when ordering parts.

WEAR PARTS LIST

The parts in parentheses are to be replaced at the same time.

Item		Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency
Power train filter		07063-01054 (07000-72100)	Element (O-ring)	- -	1 (1)	Every 500 hours service
Fuel filter		6732-71-6112	Cartridge	-	1	
Engine oil filter		6742-01-4120	Cartridge	-	1	
Corrosion resistor		6742-01-3970	Cartridge	-	1	
Hydraulic oil filter		21W-60-41121 (07000-12135)	Cartridge	-	1	Every 2000 hours service
Hydraulic tank breather element		20Y-60-21470	Element	-	1	
Air cleaner		600-185-4100	Element Ass'y (outer and inner)	-	1	-
Air conditioner	Fresh filter	14X-911-7750	Filter	-	2	-
	Recirc filter	20y-979-6261	Filter	-	1	
Blade	D61PX Power angle, power tiltdozer	13G-72-61420 13G-72-61410 134-72-61450 134-72-61460 (02090-11265) (02290-11219)	Cutting edge (out) Cutting edge (in) End bit (left) End bit (right) (Bolt) (Nut)	24.3 39.0 - - -	2 1 1 1 (32) (32)	-
	D61EX Power angle, power tiltdozer	134-72-61420 134-72-61410 134-72-61450 134-72-61460 (02090-11265) (02290-11219)	Cutting edge (left) Cutting edge (right) End bit (left) End bit (right) (Bolt) (Nut)	36.8 24.3 - - -	1 1 1 1 (27) (27)	-
	D61PX Power tiltdozer	14Y-71-11210 13G-71-61410 14Y-71-11330 14Y-71-11340 (02090-11270) (02290-11219)	Cutting edge (left) Cutting edge (right) End bit (left) End bit (right) (Bolt) (Nut)	45.5 39.0 - - - -	1 1 1 1 (32) (32)	-

NOTICE
When handling parts that weigh more than 25 kg (55 lb), remember that they are heavy objects, and take the necessary care.

USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE -22 -30 / -4 -20 / 14 -10 / 32 0 / 50 10 / 68 20 / 86 30 / 104°F 40°C
Engine oil pan	Engine oil	SAE30 (32 0 – 104°F 40°C); SAE10W (-4 -20 – 50 10); SAE10W-30 (-4 -20 – 104°F 40°C); SAE15W-40 (14 -10 – 104°F 40°C); SAE5W-30 (-22 -30 – 50 10)
Damper case		SAE30 (-4 -20 – 104°F 40°C)
Idler (each)		
Hydraulic system		SAE10W (-4 -20 – 104°F 40°C); SAE10W-30 (-4 -20 – 104°F 40°C); SAE15W-40 (14 -10 – 104°F 40°C)
Power train case		SAE30 (32 0 – 104°F 40°C)
Final drive case (each)		SAE10W (-4 -20 – 50 10)
Fuel tank	Diese fuel	ASTM D975 No.2 (14 -10 – 104°F 40°C); *1 (-22 -30 – 14 -10)
Grease fiting	Grease	NLGI No.2 (14 -10 – 104°F 40°C)
Cooling system	Water	Add antifreeze (-22 -30 – 32 0)

*1: ASTM D975 No.1

		Engine oil pan	Damper case	Idler (each)	Hydraulic system	Power train case	Final drive case (each)	Fuel tank	Cooling system (incl. sub-tank)
Specified capacity	Liter	23	1.3	0.22	95	100	32	390	44
	US gal	6.08	0.34	0.06	25.10	26.42	8.45	103.04	11.62
Refill capacity	Liter	19	1.3	0.22	55	69	28.5	-	-
	US gal	5.02	0.34	0.06	14.53	18.23	7.52	-	-

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

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] 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 dieselmulti-grade *Sigma 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 CRD	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	Antifeeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgease 77 Mobilgrease special	-

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
14	PENNZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White-bearing grease	Anti-freeze and summer coolant
15	PETRO-FINA	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 antifreeze 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	-	Antifreeze

STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

TORQUE LIST

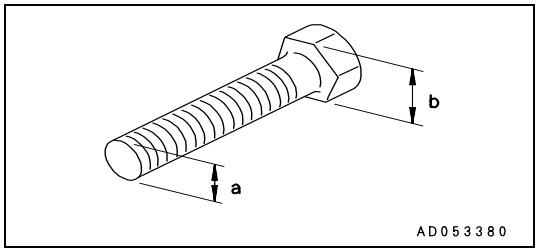
⚠ CAUTION

If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness 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.

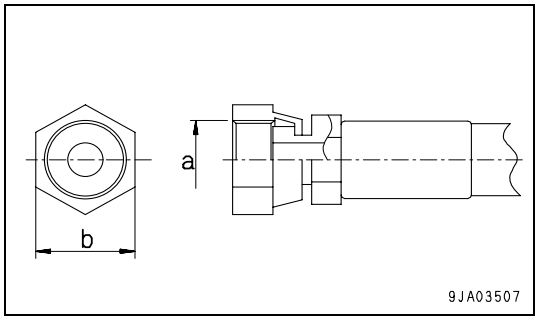
If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
6	10	13.2	1.35	9.8	11.8-14.7	1.2-1.5	8.7-10.8
8	13	31	3.2	23.1	27-34	2.8-3.5	20.3-25.3
10	17	66	6.7	48.5	59-74	6.0-7.5	43.4-54.2
12	19	113	11.5	83.2	98-123	10.0-12.5	72.3-90.4
14	22	172	17.5	126.6	153-190	15.5-19.5	112.1-141
16	24	260	26.5	191.7	235-285	23.5-29.5	170.0-213.4
18	27	360	37	267.6	320-400	33.0-41.0	238.7-296.6
20	30	510	52.3	378.3	455-565	46.5-58.0	336.3-419.5
22	32	688	70.3	508.5	610-765	62.5-78.0	452.1-564.2
24	36	883	90	651	785-980	80.0-100.0	578.6-723.3
27	41	1295	132.5	958.4	1150-1440	118.0-147.0	853.5-1063.3
30	46	1720	175.0	1265.8	1520-1910	155.0-195.0	1121.1-1410.4
33	50	2210	225.0	1627.4	1960-2450	200.0-250.0	1446.6-1808.3
36	55	2750	280.0	2025.2	2450-3040	250.0-310.0	1808.3-2242.2
39	60	3280	335.0	2423.1	2890-3630	295.0-370.0	2133.7-2676.2



Apply the following table for Hydraulic Hose.

Nominal - No. of threads (a)	Width across flats (b) (mm)	Tightening torque					
		Target value			Permissible range		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
9/16 -18UNF	19	44	4.5	32.5	35 - 63	3.5 - 6.5	25.3 - 47.0
11/16 -16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16 -16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1 -14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
13/16 -12UN	36	216	22.0	159.1	177 - 245	18.0 - 25.0	130.2 - 180.8



PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

For using 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 perform the following checks with hydraulic hoses which need to be replaced periodically. Tighten all loose clamps and replace defective hoses, as required.

When replacing hoses, always replace O-rings, gaskets, and other such parts at the same time.

Have your Komatsu distributor replace the critical parts.

SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - injection pump)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (injection pump - fuel filter)	2	
3	Fuel return hose (injection pump - fuel tank)	1	
4	Fuel return hose (injection nozzle - fuel tank)	1	
5	Hose (PPC charge valve - PPC valve)	1	
6	Hose (hydraulic tank - PPC valve)	1	
7	Hose (PPC valve - main valve)	2	
8	PPC pressure detection hose	1	
9	Hose (PPC charge valve - hydraulic tank)	1	
10	Hose (power train strainer - power train pump)	1	
11	Hose (power train pump - power train filter)	1	
12	Hose (power train filter - transmission case)	1	
13	Hose (transmission case - steering case)	1	
14	Hose (power train lubrication pump - steering case)	1	
15	Hose (Scavenging pump - Steering case)	1	
16	Hose (torque converter case - transmission oil cooler)	1	
17	Hose (transmission oil cooler - transmission case)	1	
18	Brake pressure detection hose	1	
19	Torque converter inlet post pressure detection hose	1	
20	Torque converter outlet post pressure detection hose	1	
21	Transmission modulation pressure detection hose	1	
22	Hose (hydraulic oil tank - HSS pump)	2	
23	Hose (HSS pump - PPC pump)	1	
24	Hose (HSS pump - main valve)	1	
25	Hose (main valve - HSS motor)	2	
26	Hose (HSS motor - hydraulic tank)	2	
27	Seat belt	1	Replace 3 years

MAINTENANCE SCHEDULE CHART

MAINTENANCE SCHEDULE CHART

WHEN REQUIRED

CHECK BEFORE STARTING

EVERY 50 HOURS SERVICE

EVERY 250 HOURS SERVICE

EVERY 500 HOURS SERVICE

EVERY 1000 HOURS SERVICE

EVERY 2000 HOURS SERVICE

EVERY 4000 HOURS SERVICE

SERVICE PROCEDURE

WHEN REQUIRED

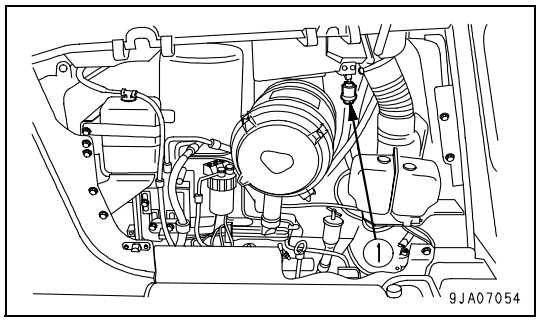
CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

⚠ 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 protective glasses, dust mask, and other protective equipment.**

CHECKING

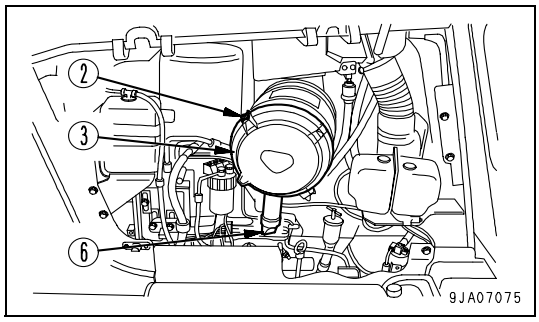
If the yellow piston at the display portion of dust indicator (1) becomes red (7.5 kPa), clean the outer element.



NOTICE
Do not clean the filter element until after a yellow piston in the dust indicator display has come in the red area (7.5 kPa).
If the filter element is cleaned frequently before the yellow piston in the dust indicator display comes in the red area (7.5 kPa), the air cleaner cannot exert its inherent cleaning capability, reducing its cleaning effect.
In addition, dust sticking to the element falls into the inner element each time the element is cleaned.

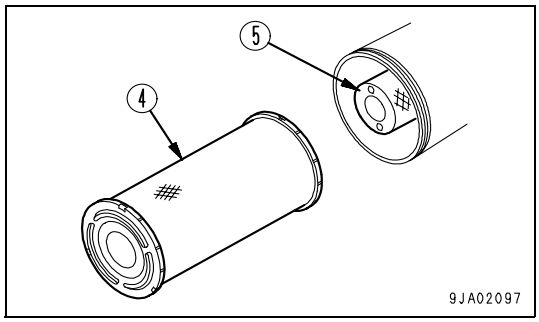
CLEANING OR REPLACING OUTER ELEMENT

1. Open the left engine side cover.
2. Remove four clips (2), then remove cover (3).



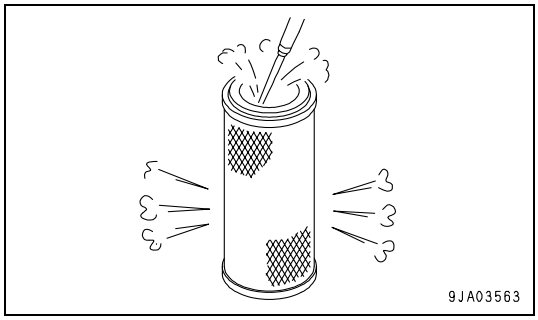
NOTICE
Never remove inner element (5). If it is removed, dust will enter and cause engine trouble.

3. Remove outer element (4).



4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).

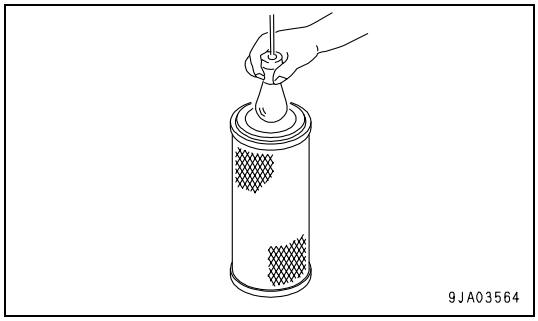
NOTICE
The inner element must not be used again even after cleaning. When replacing the outer element, replace the inner element at the same time.



5. Direct dry compressed air (Max. 0.69 MPa (7 kgf/cm2, 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.
6. Replace any outer element which has been cleaned 6 times or used for one year. Replace the inner element at the same time.
7. Even if the outer element has not been cleaned 6 times, if the yellow piston in the dust indicator goes to the 5 kPa position immediately after cleaning (when the engine is running at high idling, replace both the inner and the outer element.

REMARK
On machines equipped with a high suction resistance precleaner or rain cap, if the yellow piston goes above the 7.5 kPa position immediately after cleaning, replace both the inner and the outer element.

8. 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.

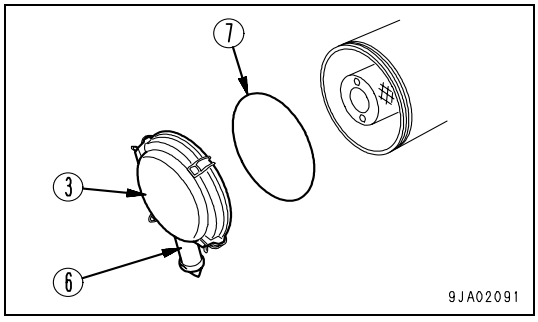


NOTICE
When cleaning the element, do not hit or beat it against anything.
Do not use an element whose folds, gasket or seal are damaged.

9. Before installing the outer element, check that the inner element is fitted securely. If the inner element is not fitted securely, push it in properly.

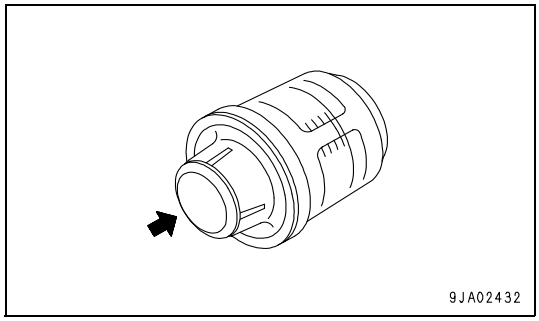
⚠ CAUTION

When installing the cover (3), check O-ring (7) and replace it if there are any scratches or damage.



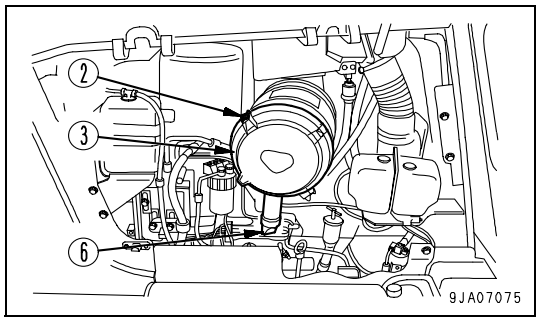
10. Set the cleaned outer element in position, then secure cover (3) with mounting clips (2).

11. Push the button of dust indicator (1) and return the yellow piston to its original position.
12. Close the left engine side cover.



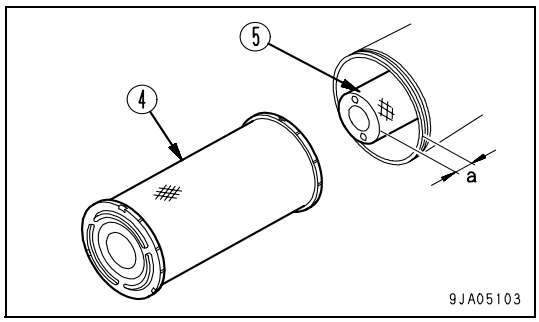
REPLACING ELEMENT

1. Open the left engine side cover.
2. Remove four clips (2), then remove cover (3).



3. Remove outer element (4).

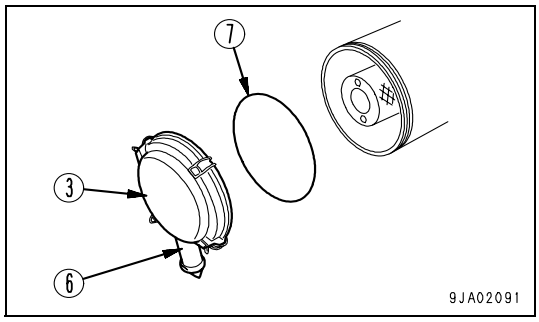
   Do not remove inner element (5) at this time, however.
4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).



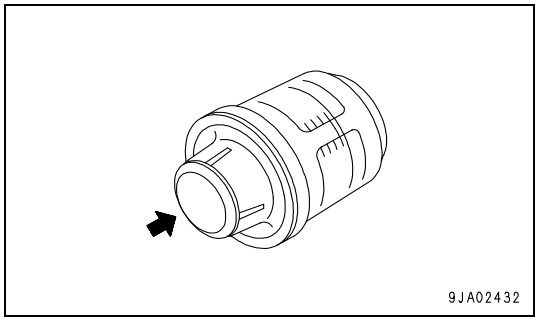
NOTICE
If the outer element and cover are installed when the inner element is not installed properly, the outer element may break.
When installation is correct, protrusion "a" of the inner element from the air cleaner body is 35 mm.

5. Remove inner element (5), then quickly install the new inner element.

   Push the inner element in properly and check that it is fitted securely.
6. Set the new outer element (4) in position.
7. Replace O-ring (7) for cover (3) with new one.
8. Set the arrow mark on cover (3) at the top, install to the air cleaner body, then secure with clip (2).



9. Push the button of dust indicator (1) and return the yellow piston to its original position.



REMARK
The yellow piston in the dust indicator may go to a position between 3.7 kPa - 5.0 kPa immediately after the element has been replaced with a new element, but this does not indicate any abnormality.
On machines equipped with a high suction resistance pre-cleaner or rain cap, the yellow piston in the dust indicator may go to a position between 5.0 kPa - 6.2 kPa immediately after the element has been replaced with a new element, but this does not indicate any abnormality.

10. Close the left engine side cover.

CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

- **Just after the engine is stopped, the coolant is still hot and the internal pressure in the radiator is still high. If the radiator cap is removed under this condition, you may scald yourself. Accordingly, wait until the temperature goes down, then loosen the cap slowly to release the pressure.**
- **Start the engine to clean the cooling system. When standing up from the operator's seat or leaving the machine, set the work equipment lock lever and parking brake lock lever to the LOCK positions.**
- **For the starting method of the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (3-72)" and "STARTING ENGINE (3-89)" in the OPERATION section of the manual.**
- **Never go under the machine body while the engine is running. It is very dangerous since the machine may move suddenly.**

Stop the machine on level ground when cleaning or changing the coolant.

When flushing the inside of the cooling system, do as follows.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Replace corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 500 hours and when cleaning the inside of the cooling system and when changing coolant
Non permanent type antifreeze containing ethylene glycol (Winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours whichever comes first	

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

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.

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°C (18°F) lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	Above -10	-15	-20	-25	-30
	°F	Above 14	5	-4	-13	-22
Amount of antifreeze	Liters	13.2	15.8	18.0	20.2	22.0
	US gal	3.49	4.17	4.76	5.34	5.81
Amount of water	Liters	30.8	28.2	26.0	23.8	22.0
	US gal	8.13	7.45	6.86	6.28	5.81

⚠ WARNING

Antifreeze is flammable, so keep it away from flame.
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.

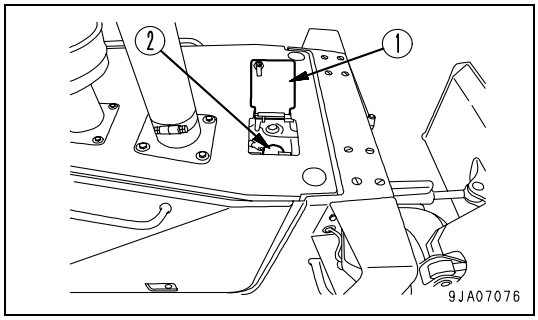
Use city water for the coolant.

If river water, well water or other such water supply must be used, contact your Komatsu distributor.

We recommend use of an antifreeze density gauge to control the mixing proportions.

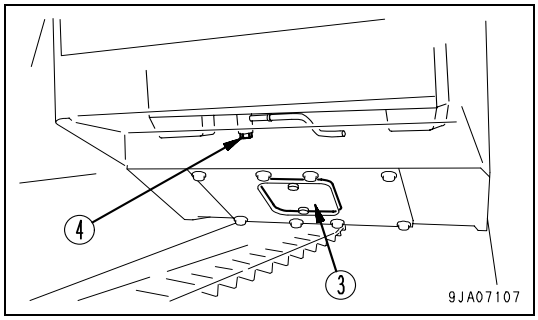
- Prepare a container having capacity of at least 45 liters (11.89 US gal)to receive the antifreeze solution.

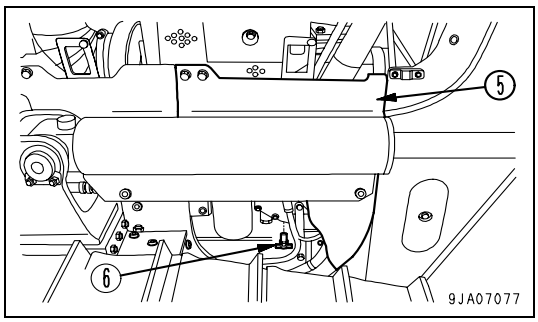
1. Stop the engine.
2. Open cover (1), then turn the radiator cap (2) slowly until it contacts the stopper to relieve the pressure.
3. Following this, push radiator cap (2), turn it until it contacts the stopper, then remove it.



4. Remove cover (3), set a container under the radiator, open drain valve (4) at the bottom of the radiator, and drain the coolant into the container.
5. Open the side cover on the right side of the engine, remove cover (5), then open drain valve (6) in the side face of the cylinder block and drain the coolant.
6. After draining the antifreeze solution, close drain valve (4), (6), then fill with clean water. After the radiator is filled with water, start and run the engine at low idling speed. After the water temperature rises above 90°C (194°F), run the engine for about 10 minutes.
7. Stop the engine and open drain valve (4), (6) to drain the water.
8. After draining the water, clean the cooling system with cleaning agent.

   For the cleaning method, see the instructions for the cleaning agent.



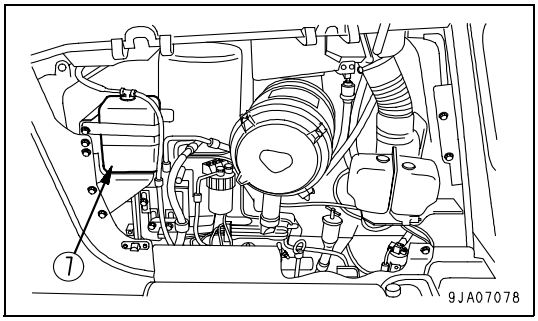


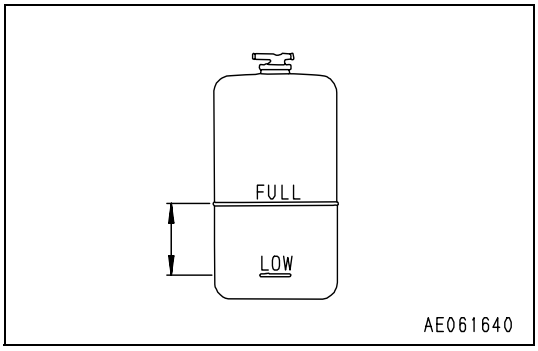
9. Add coolant until it overflows from the water filler.

   Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.

10. To remove air in the cooling system, run the engine for 5 minutes at low idle, then for 5 minutes at high idle. (While doing this, leave the radiator cap removed.)

11. Open the engine side cover on the left side of the chassis.
12. Drain the cooling water inside sub-tank (7), clean the inside of the sub-tank, then fill again with cooling water to a point midway between the FULL and LOW marks.
13. Stop the engine and tighten the cap. Check the coolant level, and add water if the level is low.





CHECK TRACK SHOE TENSION, ADJUST

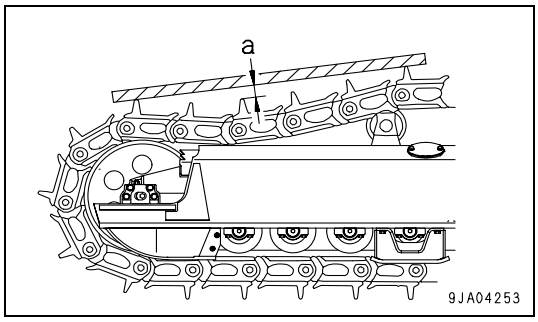
The wear of pins and bushings on the undercarriage will vary with the working conditions and types of soil. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

Carry out the check and adjustment under the same conditions as when operating (on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance (a) is 20 to 30 mm (0.79 to 1.18 in), the tension is standard.

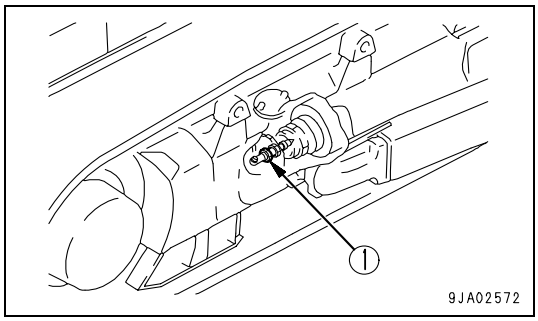
If the track tension is not at the standard value, adjust it in the following manner.



ADJUSTMENT

⚠ WARNING

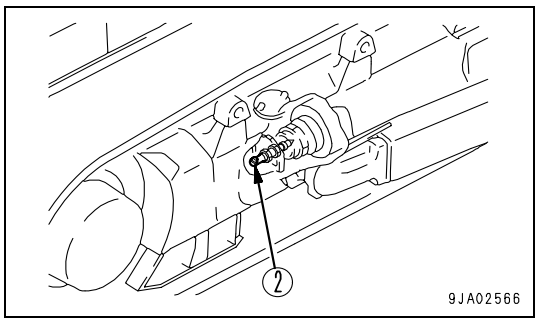
There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.
Never loosen any part other than plug (1). Never put your face in the mounting direction of plug (1).
If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



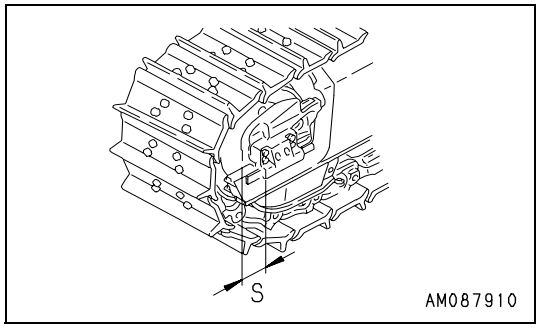
WHEN INCREASING TENSION

Prepare a grease gun.

1. Pump in grease through grease fitting (2) with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.



4. Continue to pump in grease until S becomes 0 mm. If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.

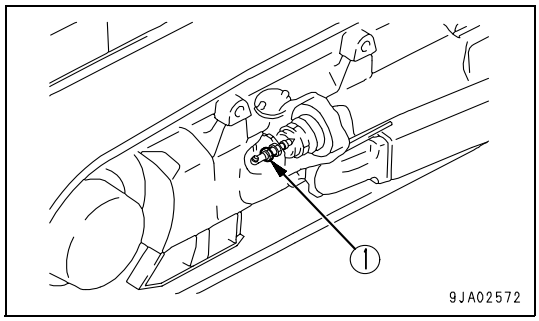


WHEN LOOSENING TENSION

⚠ WARNING

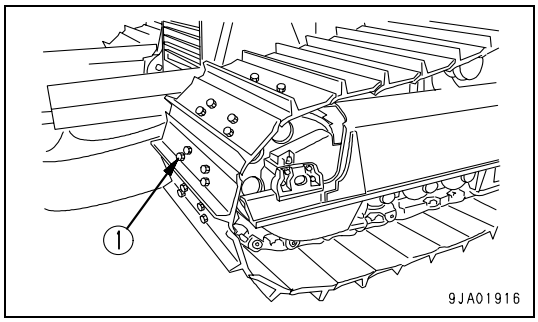
It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

1. Loosen plug (1) gradually to release the grease.
2. When loosening plug (1), turn it a maximum of one turn.
3. If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
4. Tighten plug (1).
5. To check that the correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.



CHECK AND TIGHTEN TRACK SHOE BOLTS

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.



METHOD OF TIGHTENING (TRACK SHOE BOLTS)

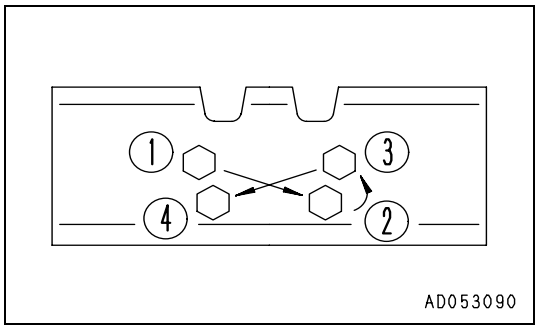
1. Torque the track shoe bolts to 539 ± 49 N·m (55 ± 5 kg·m, 398 ± 36.2 lb ft). Then ensure the nut and shoes are in close contact with the link contact surface.
2. After checking, tighten a further. 120° ± 10°.

METHOD OF TIGHTENING (MASTER CONNECTING BOLT)

1. First tighten to a tightening torque of 343 ± 39 N·m (35 ± 4 kgf·m, 253 ± 29 lbft) then check that the link contact surfaces are in close contact.
2. After checking the link contact surfaces, tighten the bolt by 180° (Allowable range: 0° - 20°).

ORDER FOR TIGHTENING

Tighten the bolts in the order shown in the diagram on the right.



CHECK ELECTRICAL INTAKE AIR HEATER

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

REVERSE AND REPLACE END BITS AND CUTTING EDGES

⚠ WARNING

When carrying out this operation, it is extremely dangerous if the work equipment is moved by mistake. Set the work equipment in a stable condition, stop the engine, and set the work equipment lock lever securely to the LOCK position.

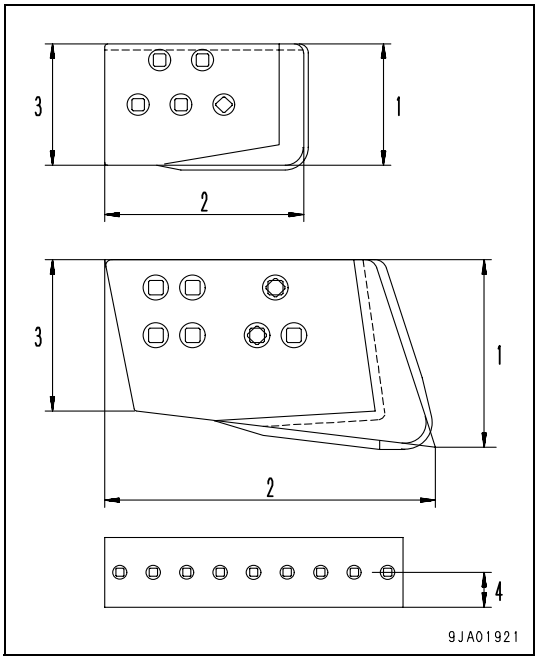
Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height, apply a block under the frame to prevent the blade from falling.
2. Set the work equipment lock lever to the LOCK position and stop the engine.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Wear standards

Wear standards Unit [mm (in)]

Item			Judgement standard	
No.	Measurement point	Work equipment	Standard dimension	Repair limit
1	Height of outside of end bit	A	237 (9.3)	204 (8.0)
		B	237 (9.3)	204 (8.0)
		C	237 (9.3)	204 (8.0)
2	Width of end bit	A	325 (12.8)	300 (11.8)
		B	325 (12.8)	300 (11.8)
		C	325 (12.8)	300 (11.8)
3	Height of inside of end bit	A	204 (8.0)	187 (7.4)
		B	204 (8.0)	187 (7.4)
		C	204 (8.0)	187 (7.4)
4	Height of cutting edge (from center of bolt mounting hole to end face)	A	102 (4.0)	85 (3.3)
		B	102 (4.0)	85 (3.3)
		C	102 (4.0)	85 (3.3)



The symbols in the work equipment column have the following meaning.

A: Power angle, powertilt dozer (D61EX)

B: Power angle, powertilt dozer (D61PX)

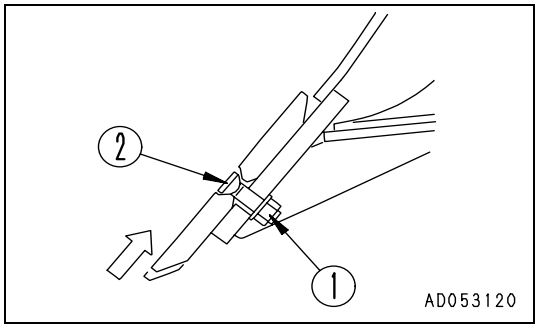
C: Powertilt dozer (D61PX)

D: Semi-U blade (D61EX)

REMARK
If the cutting edge and the end bit on both sides are worn out, replace with new one.
If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.

4. Remove the cutting edge and the end bit and clean the mounting surface.
5. Reverse or replace the cutting edge and the end bit when worn out.

6. Remove nut (1) and bolt (2), then replace or reverse the cutting edge and the end bit.
7. Install the cutting edge to the blade and tighten the bolt temporarily. Press the blade against the ground to eliminate the play of bolt (2), then tighten the bolt to the specified torque.



Nut tightening torque:

Power angle, powertilt dozer (EX,PX): 461 ± 69 N·m (47 ± 7 kgf·m, 340 ± 51 lbft)

Powertilt dozer(PX): 461 ± 69 N·m (47 ± 7 kgf·m, 340 ± 51 lbft)

Semi-U dozer (EX) (cutting edge): 461 ± 69 N·m (47 ± 7 kgf·m, 340 ± 51 lbft)

Semi-U dozer (EX) (end bit): 745 ± 108 N·m (76 ± 11 kgf·m, 549.7 ± 79.6 lbft)

If bolt (2) and nut (1) are damaged, replace them with new ones at the same time.

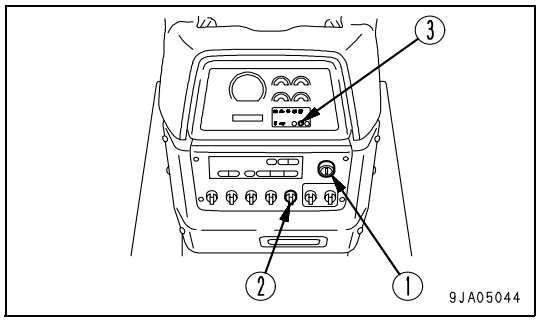
8. After several hours of running, retourque the nuts.

CLEAN, CHECK RADIATOR FINS

If the radiator fins are clogged or dirty, clean and inspect them.

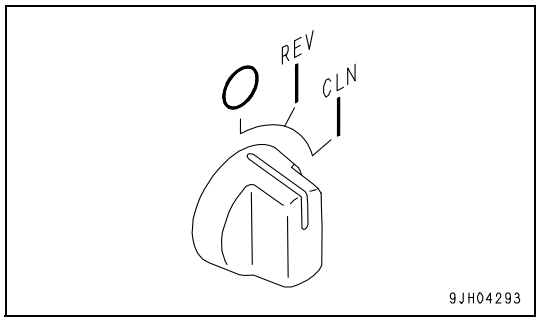
CLEANING BY ROTATING COOLING FAN IN REVERSE DIRECTION

NOTICE
When rotating the cooling fan in the reverse direction, be extremely careful of flying dust.
When stopping the engine when the cooling fan is rotating in the reverse direction, first run the engine at low idling, then stop it.

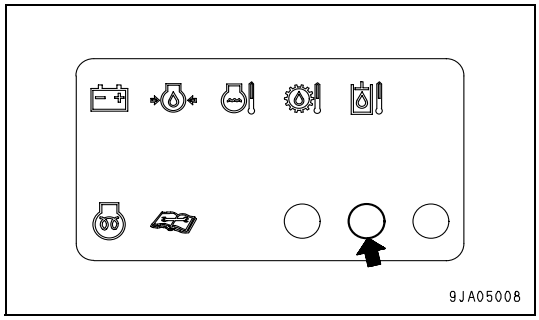


The dust and dirt stuck to the radiator and cooler can be blown out by rotating the cooling fan in the reverse direction.

1. Turn starting switch (1) to the OFF position and stop the engine.
2. Turn starting switch (1) to the ON position.
3. Set fan rotation selector switch (2) to the cleaning position (CLN:(C)).



REMARK
If the engine is running, the direction of rotation of the fan will not change even when the fan rotation selector switch is operated.
Fan operation confirmation lamp (3) will flash to inform the operator that the direction of rotation of the fan has not been switched.
Stop the engine, then start it again. The direction of rotation of the fan will be switched.



4. Turn starting switch (1) to the START position and start the engine. The cooling fan will rotate in the reverse direction.
5. Run the engine at high idling.

   Select the time for running the engine at high idling as follows according to the condition of clogging.

   Normal clogging: 1 to 2 minutes

   Excessive clogging: 2 to 3 minutes
6. After completing the cleaning, run the engine at low idling for approx. 10 seconds.
7. Turn starting switch (1) to the OFF position and stop the engine.
8. Turn starting switch (1) to the ON position.

9. Turn the fan rotation selector switch (2) to the normal rotation position (a) and cancel the reverse rotation.
10. After cleaning, inspect the engine room and remove any dirt.

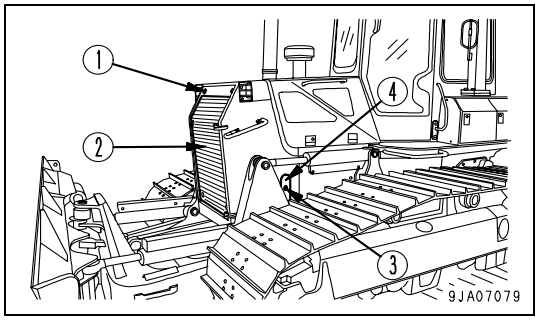
CLEANING WITH COMPRESSED AIR

⚠ WARNING

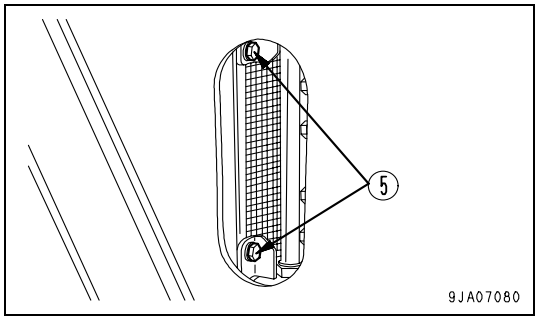
- **Directing compressed air, pressurized water, or steam directly at your body, or using these and causing dust to fly may cause personal injury. Always wear protective glasses, anti-dust mask, and other protective equipment.**
- **When carrying out cleaning, always stop the engine and check that the fan is not rotating. If you touch the fan when it is rotating, it will cause serious personal injury.**

If there is severe clogging of the radiator fins with dust, use compressed air to clean.

1. Remove bolts (1) (6 bolts).
2. Open the radiator mask (2).
3. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.
4. Remove bolt (3), then remove cover (4).

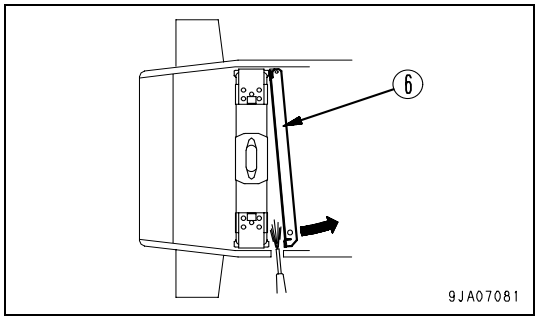


5. After removing cover (4) remove bolts (5) inside the cover.



6. Swing hydraulic cooler (6) to the rear to make a gap between the cooler and the radiator.
7. Using compressed air, blow out all mud, dirt, or leaves clogging the hydraulic cooler. It is also possible to use steam or water instead of compressed air.

REMARK
Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.



8. After completing the cleaning operation, return hydraulic cooler (6), radiator mask (2), and cover (4) to their original positions.

CHECK, ADJUST AIR CONDITIONER

(Machines equipped with cab)

CHECK LEVEL OF REFRIGERANT

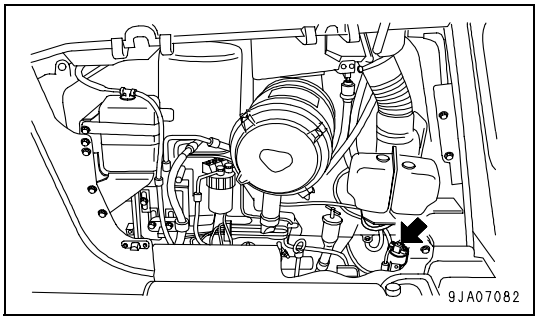
⚠ WARNING

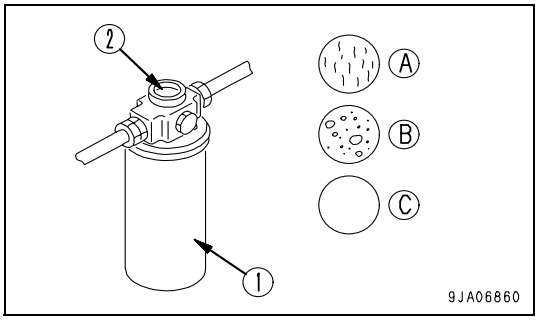
If the refrigerant used in the air conditioner gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.
Do not bring any flame close to any point where the refrigerant gas is leaking.

If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idling, and check the flow of the refrigerant gas (freon 134a) in the refrigerant circuit through the sight glass (2) (inspection window) of the receiver (1) when the cooler is running at high speed.

- (A) Correct: No bubbles are included in the flow
- (B) Low: Bubbles are included in the flow

  (bubbles pass continuously)
- (C) None: Colorless, transparent





REMARK
When there are bubbles, the refrigerant gas level is low, so contact your Komatsu distributors to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

OPERATING AIR CONDITIONER OFF-SEASON

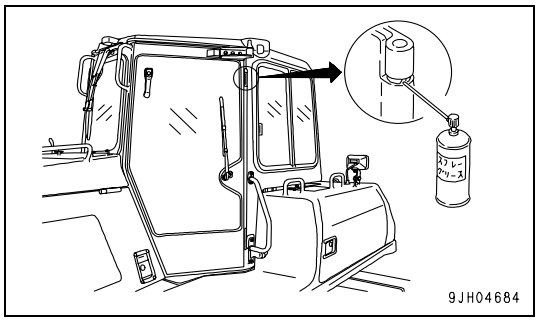
Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.

GREASE DOOR HINGE

(Machines equipped with cab)

If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the split in the hinge bushing.

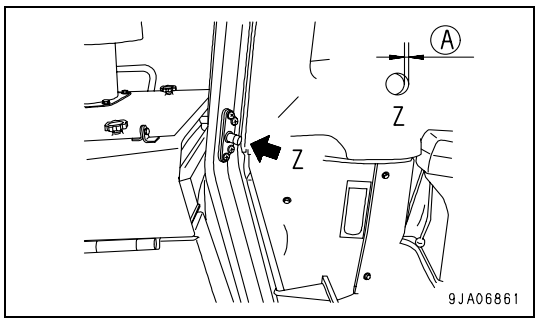
If the bushing is worn, replace the hinge.



CHECK DOOR LOCK STRIKER

(Machines equipped with cab)

If wear (A) of the door of lock striker exceeds 0.5 mm (0.02 in), replace the striker. If it is used as it is, the play will increase and this may result in breakage of the hinge or door lock.

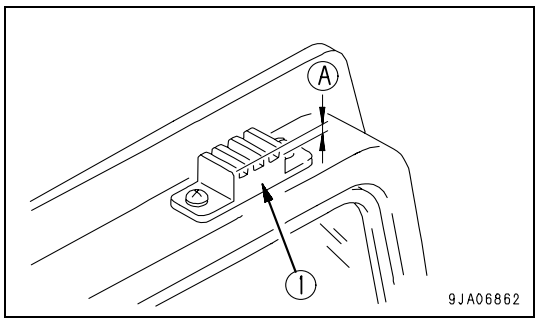


REPLACE DOOR DAMPER

(Machines equipped with cab)

If depth (A) of the groove of door damper rubber (1) is less than 2 mm (0.08 in), replace the damper.

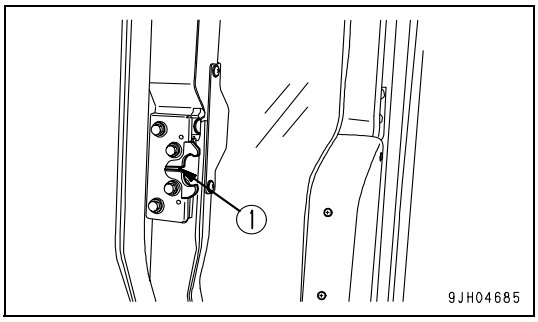
There are 4 dampers: 1 each at the top and bottom on the left and right doors.



CHECK DOOR LATCH

(Machines equipped with cab)

Hold the door open and check that there is still grease inside the latch. If the amount of grease is low or there is no more grease, coat the inside of the latch with grease from portion (1).



REMARK
If there is no more grease inside the latch, the movement will become poor because of dust inside the latch, and the handle may be stiff when opening the door.

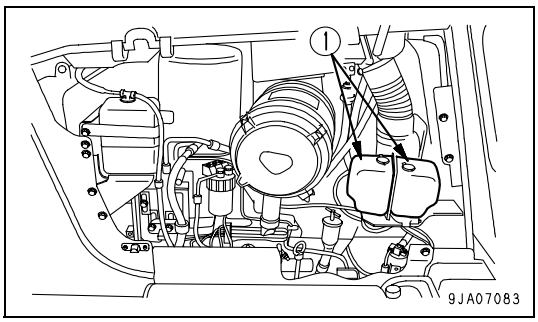
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

(Machines equipped with cab)

If there is air in the window washer fluid, check the level and add fluid.

Open the engine side cover on the left side, check the level of the fluid in window washer tank (1), and if it is low, add automobile window washer fluid.

When adding fluid, be careful not to let any dust get in.



PROPORTION FOR MIXING FLUID WITH WATER

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportions before adding.

Area, season	Proportions	Freezing temperature
Normal	Washer fluid 1/3: water 2/3	-10°C (14°F)
Winter in cold area	Washer fluid 1/2 : water 1/2	-20°C (-4°F)
Winter in extremely cold area	Pure washer fluid	-30°C (-22°F)

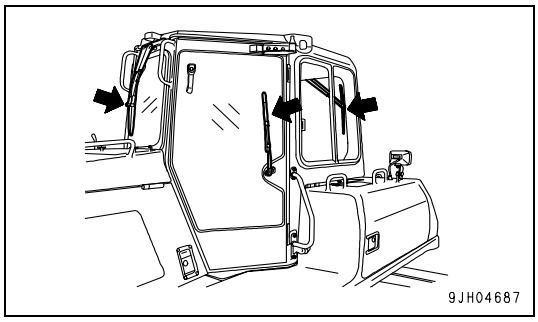
There are two types depending on the freezing temperature:

-10°C (14°F) (general use) and -30°C (-22°F) (cold area use), so select according to the area and season.

REPLACE WIPER BLADE

(Machines equipped with cab)

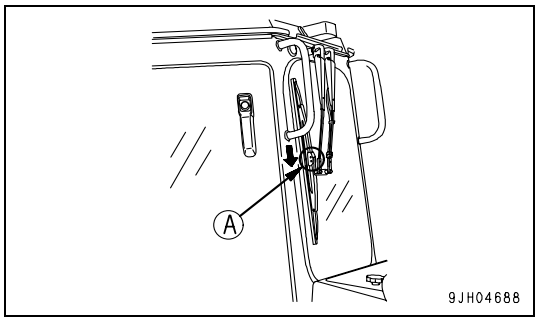
If the blade is damaged, it will not wipe the window clean, so replace the blade.

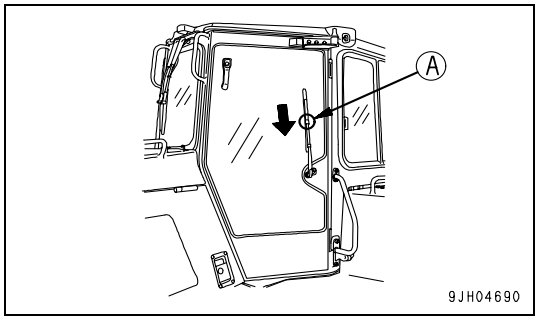


REPLACEMENT

FRONT, DOOR WIPER

1. It is hooked at portion (A), so move the blade in the direction of the arrow to remove it.
2. Install the new blade and hook it securely.

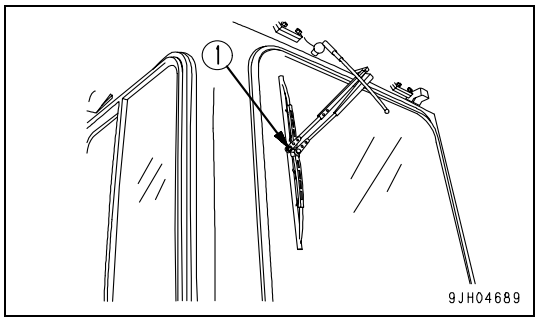




REAR WIPER

1. Remove E-ring (1).

   The blade can then be removed.
2. Install a new blade, then install securely with E-ring (1).



CHECK IDLER OIL LEVEL, ADD OIL

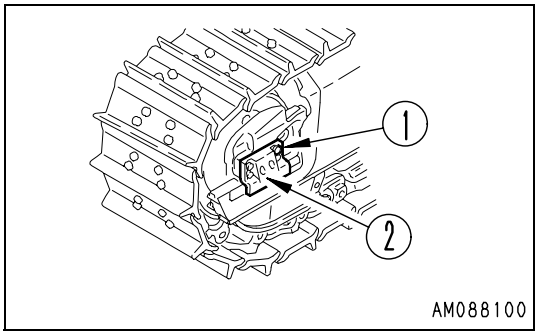
⚠ WARNING

If the oil level in the idler is low, new oil must be added, and the machine body must be inclined in this case. Since this work is dangerous, ask your Komatsu distributor.

If the oil level in the idler is low, noise will be generated and there will be seizure, so check the oil level and add oil as follows.

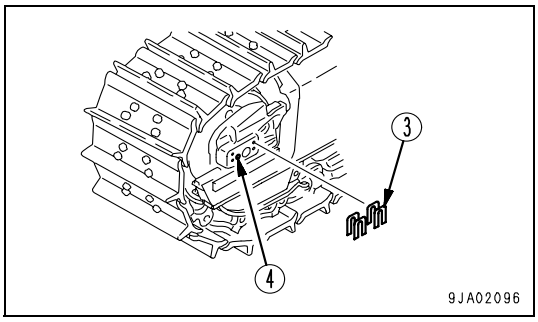
INSPECTION

1. Remove bolt (1), then remove guide plate (2) and shim (3).



REMARK
When removing shim (3) keep it in a safe place and be careful not to lose it.

2. Loosen plug (4) slowly. If oil oozes through the threads at this time, the quantity of oil is sufficient. Tighten plug (4).
3. If any oil does not flow out when plug (4) is removed, the quantity of oil is insufficient. In this case, ask your Komatsu distributor for add oil.
4. Install guide plate (2) and shim (3) with bolt (1).



REMARK
When installing guide plate (2), install the same number and thickness of shim (3) as removed in Step 1.
The optimum clearance may be obtained, if the adjustment is made at the same time. For details of adjusting the shim thickness, see “ADJUST IDLER CLEARANCE (4-38)“.

ADJUST IDLER CLEARANCE

Since the idlers are forced to move forward and backward by an external force guide plates will be worn out.

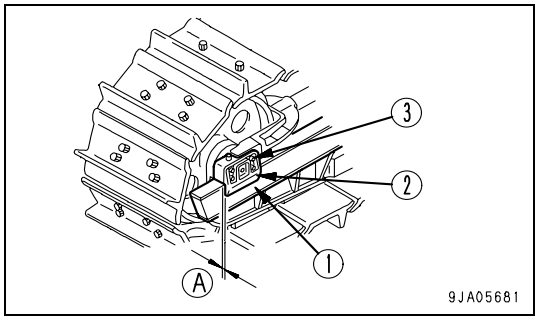
Wear of these plates will cause the vibration of idlers from side to side or inclination of the idlers, and running off of track links from the idlers or unevenly worn idler and links may result.

Therefore, adjust the idlers according to the following procedure.

ADJUSTMENT

1. Travel for 1 or 2 meters on flat ground, then measure clearance (A) between track frame (1) and guide plate (2) (4 places: left, right, inside, outside).
2. If the clearance (A) exceeds 4.0 mm (0.16 in), loosen bolt (3), and pull out the shim to adjust the clearance at one end to 0.5 to 1.0 mm (0.02 to 0.04 in).

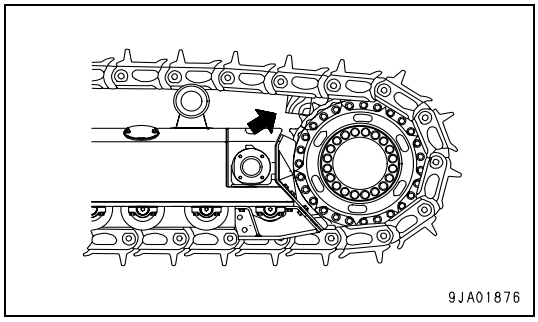
   Thickness of one shim is 1.0 mm (0.04 in).



CHECK LINK PITCH

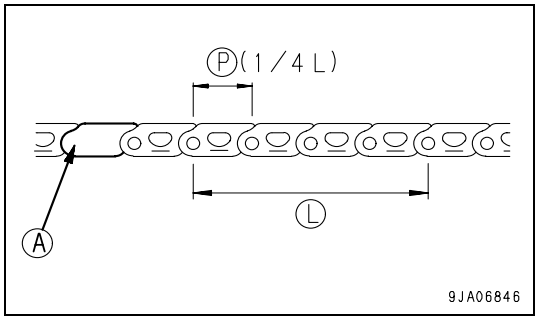
If the measured value comes close to the repair limit, please contact your Komatsu distributor.

1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.



2. Measure the pitch length (L) of 4 links at a straight portion at least 2 links from master pin (A). Divide this measurement by four to obtain the link pitch.
   - Basic link pitch (P): 190 mm (7.5 in)
   - Link pitch limit for turning: 193 mm (7.6 in)

   There is no link window on the master link.



REMARK
The measured value under decimal of link pitch is different from the basic value depending upon the precision of measure or the tolerance of product even if it isn't worn out.
Don't judge it's worn out too soon, do it with the trend of measured value after that.

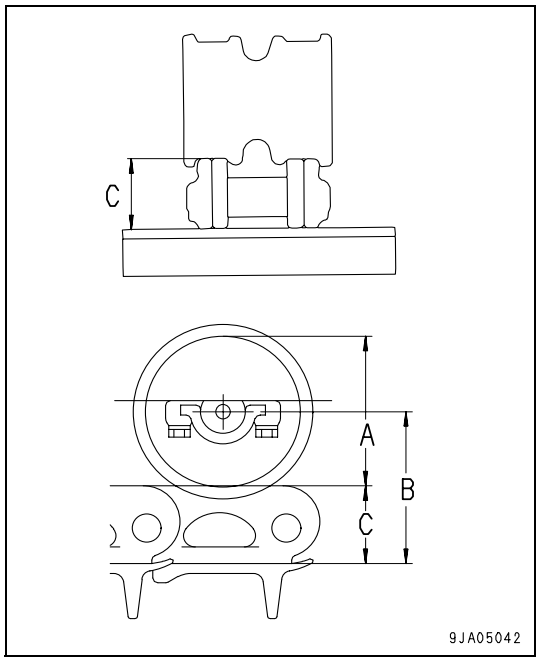
CHECK OUTSIDE DIAMETER OF TRACK ROLLER

If the measured value comes close to the repair limit, please contact your Komatsu distributor.

1. Measure the height (dimension C) of the link tread as shown in the diagram.
2. Stop machine at position where link tread, whose size C has been measured completely, contacts roller tread. Then measure size B.
3. Calculate outside diameter of tread (size A):

   A = (B - C) x 2

   - Standard size (A): 200 mm (7.9 in)
   - Repair limits: 164 mm (6.5 in)

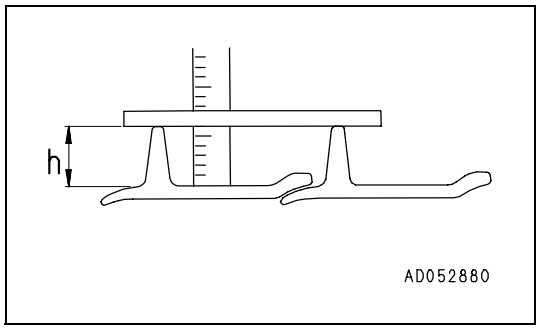


CHECK HEIGHT OF GROUSER

If the measured value comes close to the repair limit, please contact your Komatsu distributor.

After taking up slack in track shoes, measure height at center of shoe as shown below.

- Standard height (h): 55.5 mm (2.2 in)
- Repair limits: 16.5 mm (0.7 in)



ADJUST PLAY IN CENTER BALL

(Power angle, power tiltdozer only)

⚠ WARNING

When adjusting, always set the work equipment lock lever to the LOCK position except when operating the blade.

It is necessary to adjust the shim at the center ball in the following cases.

- When there is play at the center ball.
- When assembling the blade again after it has been removed for transportation of the machine.

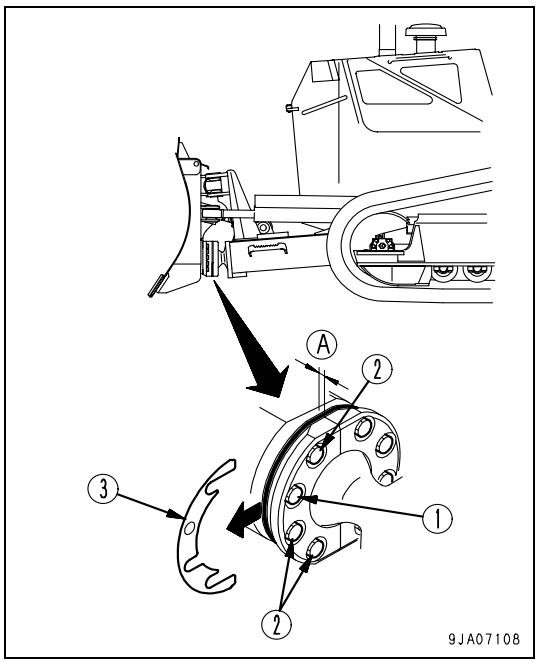
If the adjustment is not carried out, the operating response will become poor. In addition, sand and soil will enter the ball portion and cause damage or premature wear of the ball.

Adjust as follows.

Adjust with shims so that the play at the center ball is 0.2 - 0.7 mm (0.008 - 0.028 in).

1. Remove bolt (1), then loosen bolt (2).
2. Remove excess shims (3) (1 or 2 pieces), then tighten bolts (1) and (2) temporarily.
3. Angle and tilt the blade.
   - If the blade moves smoothly without making any squeaking sound, the adjustment is complete.
   - If there is a squeaking sound or the blade does not move smoothly, add shims.
   - If the play at the ball is still excessive, remove more shims.
4. If the work equipment moves smoothly, tighten bolts (1) and (2).

   Tightening torque: 588 - 1030Nm (60 - 105kgm, 434-759lbft)



Standard shim thickness (A): 6 - 8 mm (0.2 - 0.3 in)

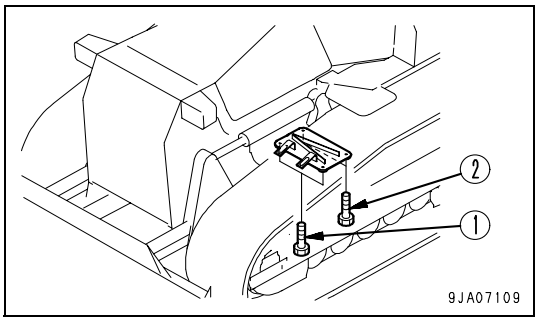
Thickness of shims: 0.5 mm (0.02 in), 1.0 mm (0.04 in)

LUBRICATING UNIVERSAL JOINT

⚠ WARNING

The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.

1. Remove the undercover from the rear bottom of the machine body as follows.
2. Remove two bolts (1) from the front side of the machine body.
3. Holding the cover, remove two bolts (2) from the rear side of the machine body.

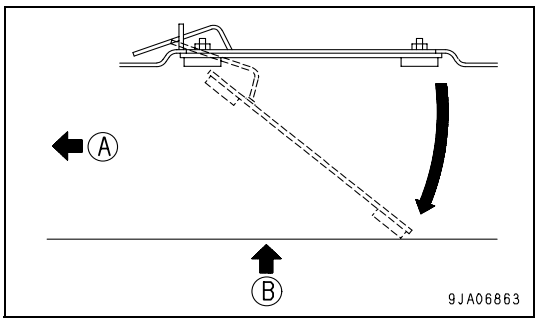


4. Lower and open the cover gradually.

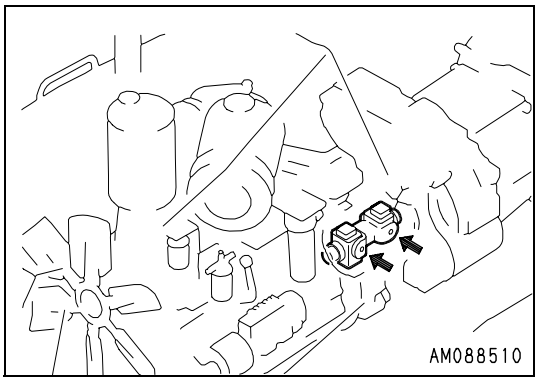
   Weight of undercover: 21 kg (46 lb)

   (A) Front of machine

   (B) Dangerous place



5. Apply grease to the grease fittings (2 places) shown by arrows.



PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM

See “STARTING ENGINE (3-89)“.

Since the engine must be started and the blade must be operated, see OPERATION.

NOTICE
If the engine is run at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.

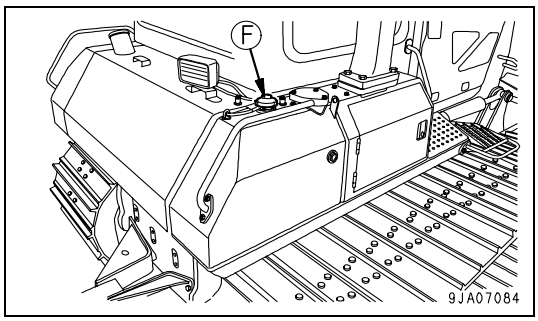
1. Bleeding air from cylinders
2. Run the engine at low idling, and extend and retract each cylinder 4 to 5 times, taking care so that a cylinder may not be brought up to its stroke end. (Stop the cylinder approx. 100 mm (3.9 in) short of its stroke end)
3. Next, operate each cylinder 3 to 4 times to the end of its stroke.
4. Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.

PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM

⚠ WARNING

- **The hydraulic system is always under internal pressure, so when inspecting or replacing the piping or hoses, always release the pressure in the circuit before starting. If the pressure is not released, high pressure oil may spurt out and cause serious personal injury.**
- **The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the pressure before removing the cap.**

1. Stop the machine on firm level ground.
2. Lower the blade to the ground, then stop the engine.
3. After stopping the engine, operate the blade control lever fully in all directions to release the internal pressure.
4. Loosen oil filler cap (F) at the top of the hydraulic tank slowly to release the internal pressure.



CHECK BEFORE STARTING

For details of the following items, see “CHECK BEFORE STARTING (3-74)“ in the OPERATION section.

- Check coolant level, add coolant
- Check oil level in engine oil pan, add oil
- Check dust indicator
- Check, drain water separator
- Check oil level in power train case, add oil
- Check electric wiring
- Check KOMTRAX antena and cable
- Check brake pedal travel
- Checking with machine monitor
- Check fuel level, add fuel
- Check horn sound
- Check that lamps light up
- Check backup alarm sound

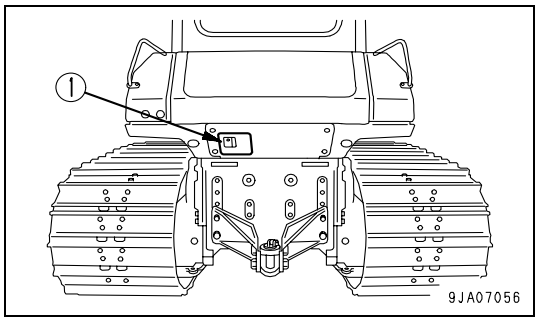
EVERY 50 HOURS SERVICE

DRAIN WATER, SEDIMENT FROM FUEL TANK

Carry out this check before operating the machine.

- Prepare a container to catch the fuel that is drained.

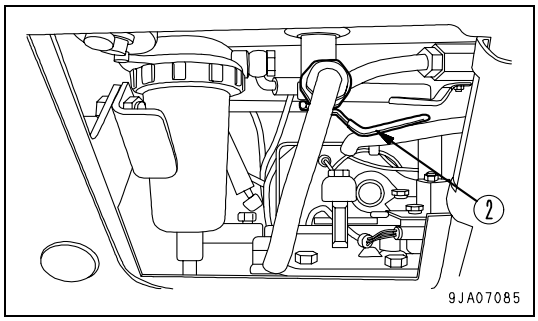
1. Open cover (1).



2. Open valve (2) at the bottom of the tank and drain the sediment and water that has accumulated at the tank bottom together with fuel.

   When doing this, be careful not to get fuel on yourself.

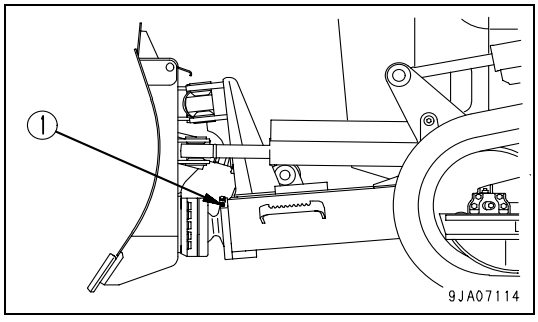
3. When clean fuel comes out, close drain valve (2).



LUBRICATING

POWER ANGLE, POWER TILTDOZER

(1) Frame center ball (1 place)



EVERY 250 HOURS SERVICE

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

LUBRICATING

1. Lower the blade to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

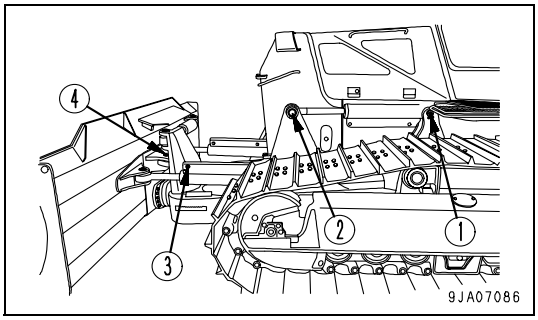
POWER ANGLE, POWER TILTDOZER

(1) Lift cylinder bottom pin (2 places)

(2) Lift cylinder head pin (2 places)

(3) Angle cylinder bottom pin (2 places)

(4) Rod pin (2 places)

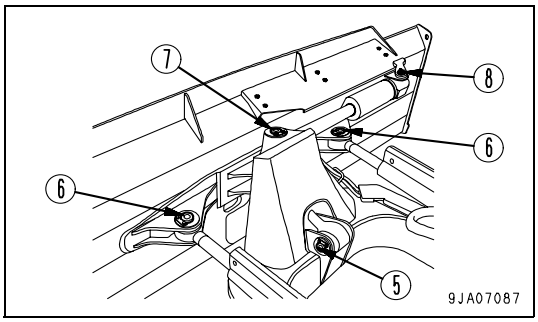


(5) Rod pin (2 places)

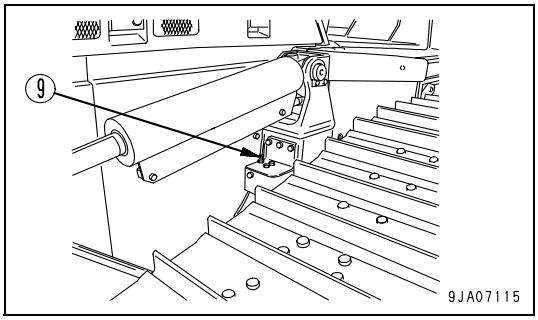
(6) Angle cylinder head pin (2 places)

(7) Tilt cylinder head pin (1 place)

(8) Tilt cylinder bottom pin (1 place)



(9) Frame mounting pin (2 places)



POWER TILTDOZER

(1) Lift cylinder bottom pin (2 places)

(2) Lift cylinder head pin (2 places)

(3) Lift rod (4 places)

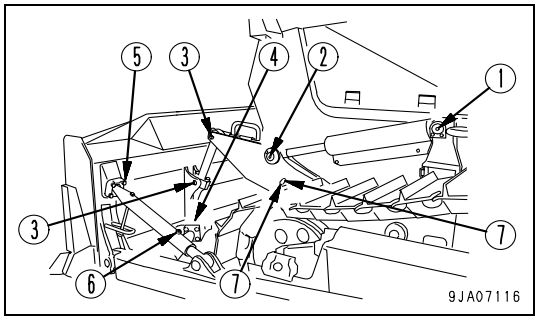
(4) Center brace ball joint (2 places)

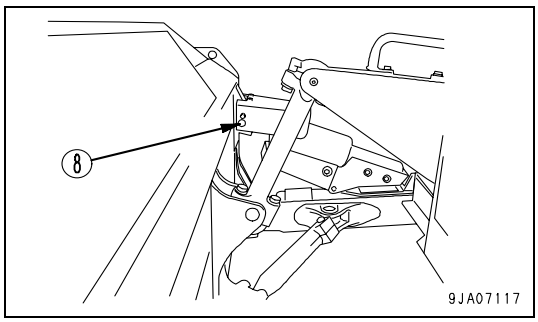
(5) Tilt brace ball joint (1 place)

(6) Tilt brace thread (1 place)

(7) Lift lever mounting pin (4 places)

(8) Tilt cylinder ball joint (1 place)



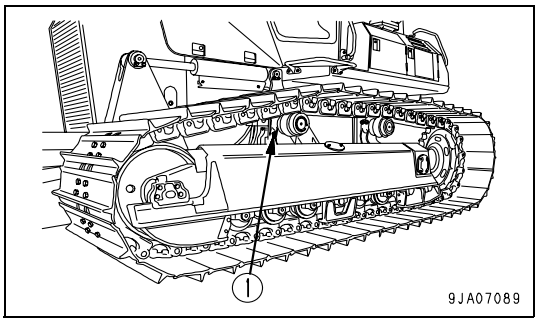


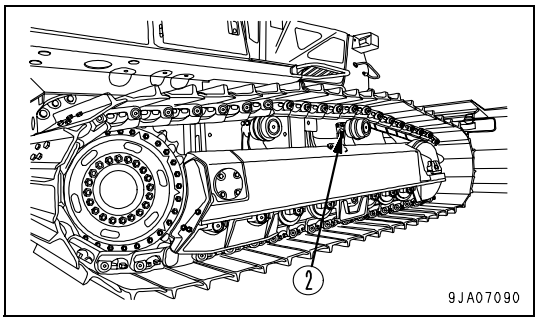
GREASE EQUALIZER BAR SIDE PIN

Greasing points

Grease fitting (1): Front of carrier roller support on left side of machine

Grease fitting (2): Rear of carrier roller support on right side of machine



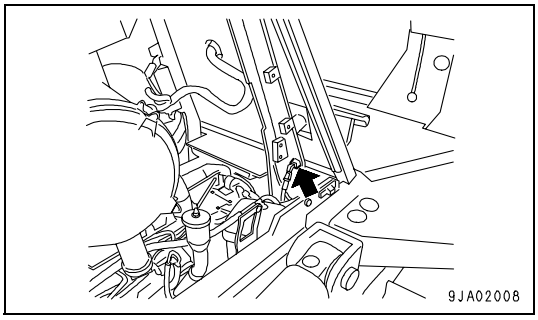


1. Remove all dirt from the top of the track frame and cover.
2. Clean the grease fitting, then supply grease to that fitting with a grease pump.

REMARK
Supply 3 shots of grease (Operate the grease pump lever 3 times) to each grease fitting, and check that grease is newly discharged through the seal lip.
If grease is not newly discharged through the lip, continue supplying grease until it is discharged.

GREASE EQUALIZER BAR CENTER PIN

(1 place)



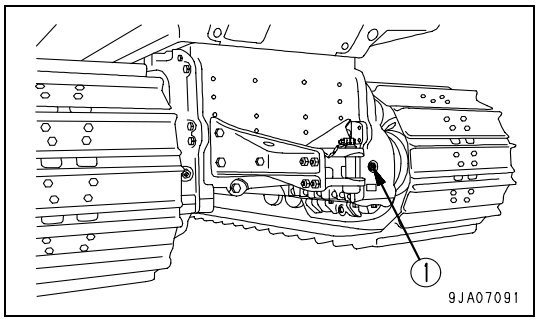
1. Open the engine side cover on the left side of the chassis.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.

CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

⚠ WARNING

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

1. Remove oil level plug (1) and check whether the final drive case is filled with oil to lower edge of the plug hole.
2. If the oil level is too low, add engine oil through the plug hole until the oil overflows.



CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

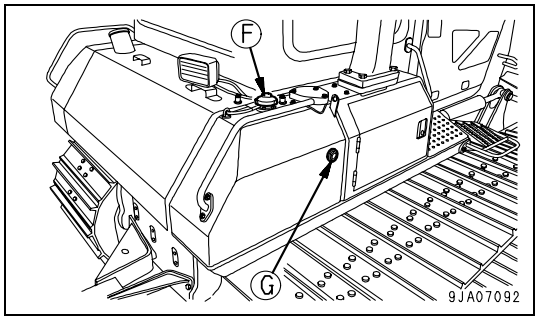
⚠ WARNING

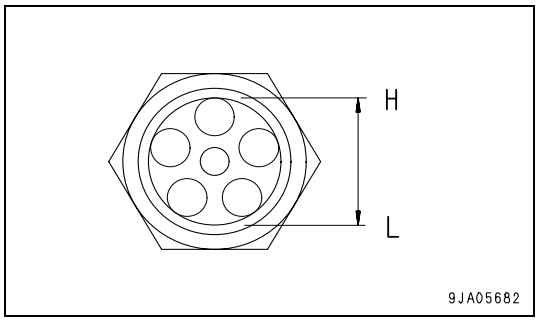
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

NOTICE

- **Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.**
- **Always lock the cap with the key.**

1. Lower blade to the ground and stop the engine. Wait for 5 minutes before checking oil level. Oil level should be between the H and L in sight gauge (G).
2. If the level is below the L mark, add oil through oil filler (F).
3. After adding oil, be sure to screw on the oil filler cap and lock it with the key.





CHECK LEVEL OF BATTERY ELECTROLYTE

Perform 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 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.**

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

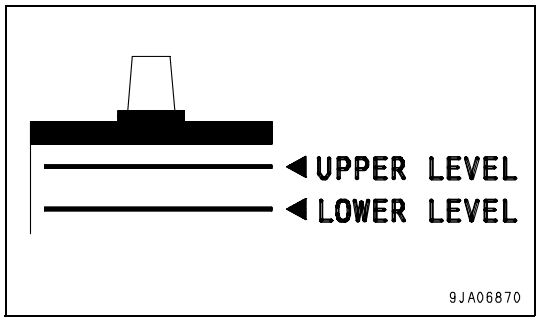
Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

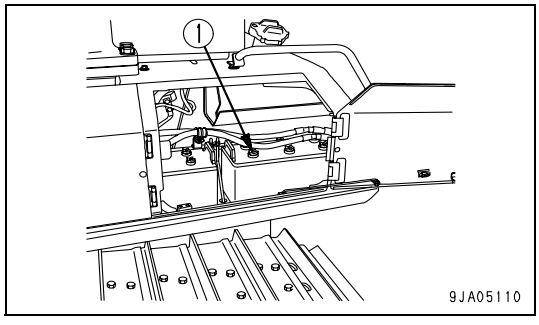
If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open the battery cover on the left side of the machine body.
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.



3. If the electrolyte level is below the midway point between the UPPER LEVEL (U.L.) and LOWER LEVEL (L.L.) lines, remove cap (1) and add distilled water to the U.L. line.
4. After adding distilled water, tighten cap (1) securely.

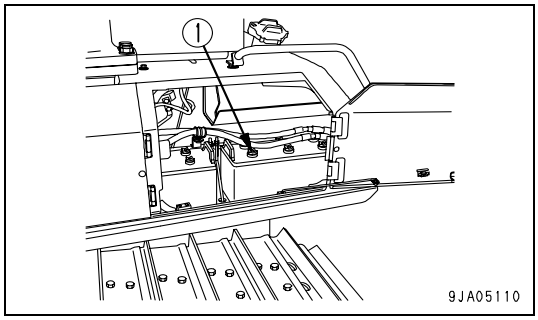


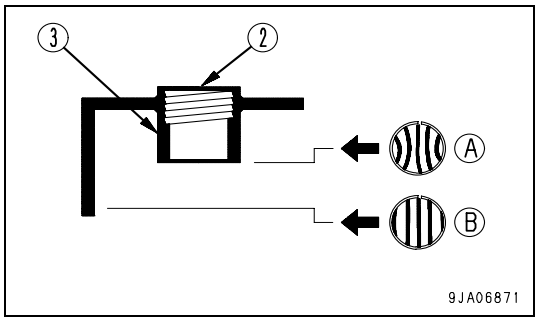
REMARK
If distilled water is added to above the UPPER LEVEL (U.L.) line, use a syringe to lower the level to the UPPER LEVEL (U.L.) line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery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

WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY

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 battery cover on the left side of the machine body.
2. Remove cap (1) at the top of the battery, look through the water filler port (2), and check the electrolyte surface. If the electrolyte does not reach the sleeve (3), add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.
   - (A) Suitable level: Electrolyte level is up to bottom of sleeve, so surface tension causes electrolyte surface to bulge and poles appear bent.
   - (B) Low: Electrolyte level is not up to bottom of sleeve, so poles appear straight and not bent.
3. 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 your Komatsu distributor or battery maker.

WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL

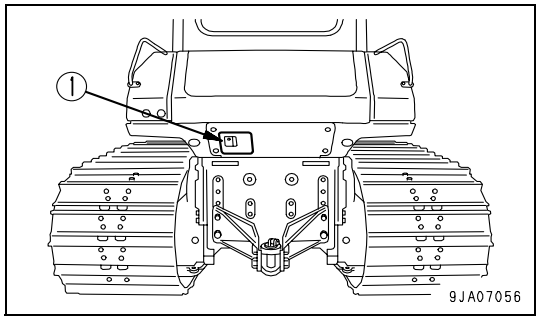
If it is possible to use and indicator to check the electrolyte level, follow the instructions given.

CLEAN WATER SEPARATOR STRAINER

⚠ WARNING

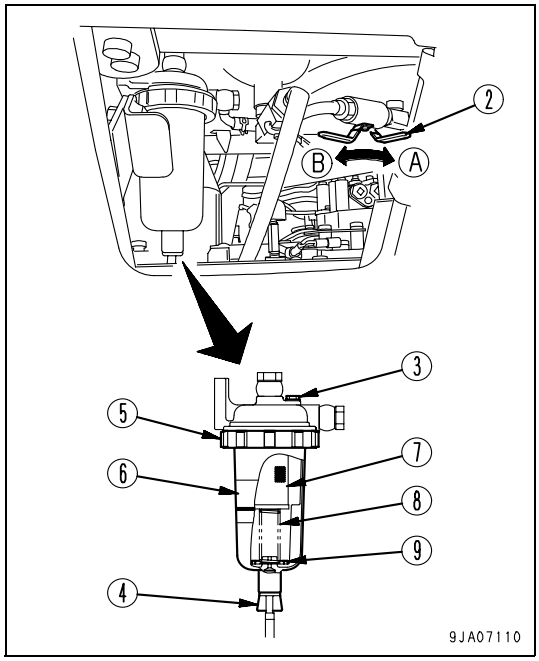
- **The engine is at high temperature immediately after the machine has been operated. Wait for the engine to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

1. Open the inspection cover (1) on the rear of the machine



2. Prepare a container to catch the drained fuel and set it under the water separator.
3. Set handle (2) to position (A) to stop fuel from flowing in.
4. Loosen plug (3).
5. Loosen drain valve (4) at the bottom of the water separator, and drain the water and fuel into the container.

   After draining, tighten plug (3).
6. Loosen ring nut (5), then remove cup (6).
7. Remove strainer (7) from the separator base.



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

8. Wash the interior of cup (6), strainer (7), spring (8), and float (9) with clean fuel.
9. Check strainer (7) and replace it if it is damaged.
10. Clean the separator base and wash strainer (7), then install the strainer to the separator base.
11. Coat the threaded portion of ring nut (5) thinly with grease.
12. Fit spring (8) and float (9) in cup (6), fill with clean fuel, install separator base, then tighten with ring nut (5).

    The specified tightening torque of ring nut (4): 37 to 43 N·m (3.8 to 4.4 kgf·m, 27.5 to 31.8 lbft)

    If the ring is loose, it will cause leakage of fuel, so always tighten it to the specified torque.
13. Set handle (2) to position (B).
14. After washing the water separator, bleed the air from the fuel circuit. For details of the procedure for bleeding the air, see “REPLACE FUEL FILTER CARTRIDGE (4-55)“.

CHECK BRAKE PERFORMANCE

⚠ WARNING

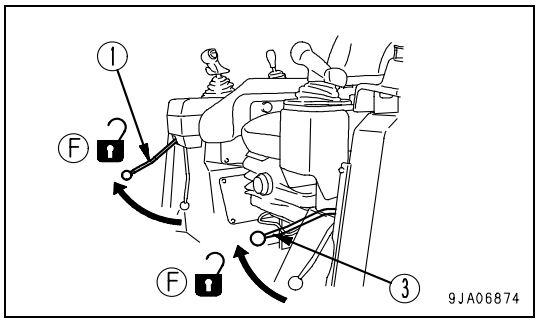
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

NOTICE
Do not place the gear shift lever in 1st under any circumstances. The machine will be damaged.

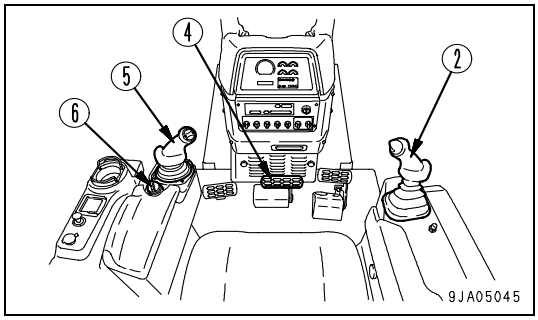
Before starting the engine, check that the area around the machine is safe, then do as follows.

1. Start the engine.
2. Set work equipment lock lever (1) to the FREE position (F) then operate blade control lever (2) to raise the blade.

   Leave the work equipment lock lever(1) to the FREE position (F).
3. Set parking brake lever (3) to the FREE position (F).



4. Depress brake pedal (4), set steering, forward-reverse, gear shift lever (5) in FORWARD, then press the shift up button to enter 2nd speed.
5. Operate fuel control dial (6) and gradually raise the engine speed to full throttle. (Keep the brake pedal depressed.)
6. Check that the machine does not move. This indicates that brake performance is normal.



CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST

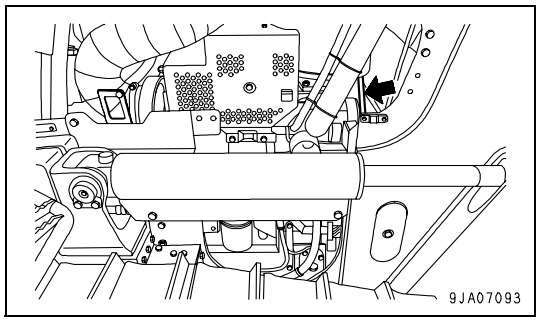
(Machines equipped with cab)

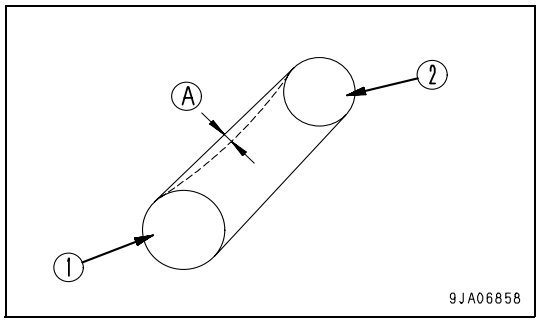
If the belt is loose, it will slip and the cooling effect will be reduced.

When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.

CHECKING

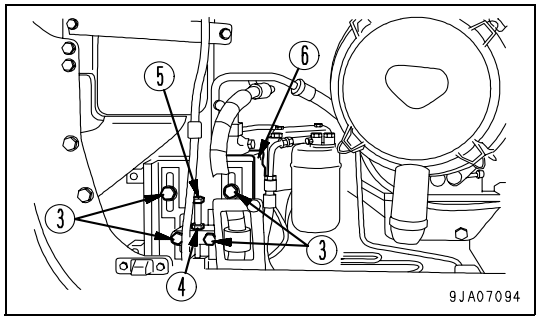
1. Open the engine side cover on the right side of the chassis.
2. Press a point midway between the drive pulley (1) and compressor pulley (2) with your finger (approx. 98 N (10 kgf)) and check that the tension is 15 to 18 mm (0.59 to 0.71 in).





ADJUSTING

1. Open the engine side cover on the left side of the chassis.
2. Loosen 4 bolts (3) and locknut (4).
3. Turn adjustment bolt (5) to move compressor (6) so that deflection (A) of the belt is 15 - 18 mm (0.6 - 0.7 in) (at a finger force of approx. 98 N (10 kg)).
4. After adjusting, tighten bolts (3) and locknut (4)



NOTICE

- **Check each pulley for damage, wear of 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 distributor 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.**

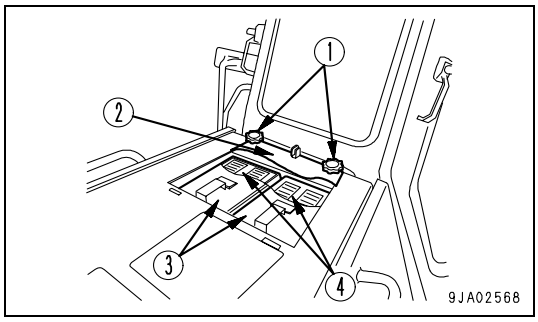
CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER)

(Machines equipped with cab)

Clean the air conditioner air filter if it becomes clogged or if there is dirt or oil stuck to it.

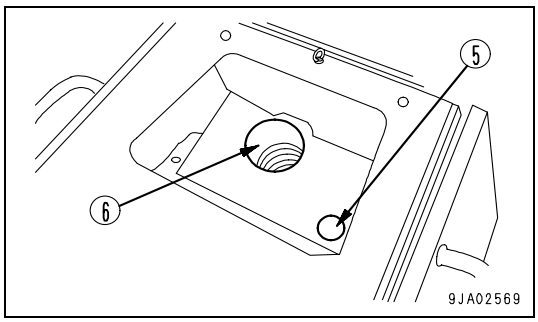
In places where there is a lot of dust, clean the air filter once a week. In addition, clean the air conditioner air filter at the same time, when cleaning the engine air cleaner.

1. Loosen mounting bolts (1), pull up inspection cover (2) to the rear, and remove it.
2. Remove inside cover (3), then remove FRESH filter (4).



3. Remove the filter box, then brush out the dirt accumulated inside the box through the cleaning hole (5) in the hood.

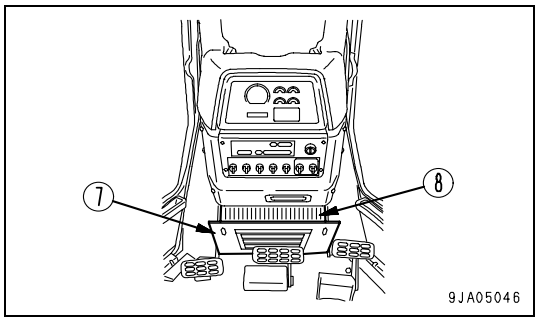
   When doing this, be careful not to let any dirt or dust get into the fresh air intake port (6) leading to the cab.



4. Open inspection cover (7) under the front panel, then pull up RECIRC filter (8) and remove it.
5. Clean filters(4) and (8) with compressed air.

   If the filters are stained with oil or extremely dirty, wash them in neutral detergent.

   After washing the filters, dry them up, then install them.



REMARK
If the filters cannot be cleaned with air or in water, replace them with new ones.

EVERY 500 HOURS SERVICE

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

REPLACE FUEL FILTER CARTRIDGE

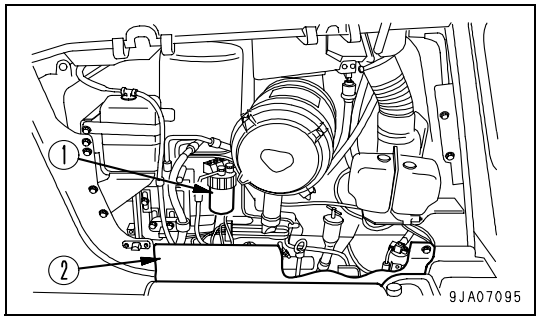
⚠ WARNING

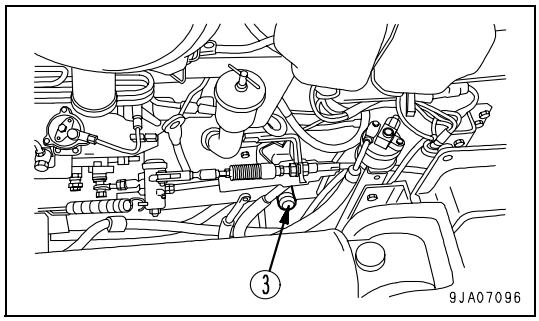
- **The engine is at high temperature immediately after the machine has been operated. Wait for the engine to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

Prepare a filter wrench and a container to catch the fuel.

1. Open the engine side cover on the left 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.
5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.

   If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.
6. Remove cover (2).
7. Loosen the knob of feed pump (3) and operate it 50 to 60 times up and down. This will bleed the air.
8. Push in the knob of feed pump (3) and tighten it.





9. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. Whenever there is leakage of fuel, follow Steps 1 and 2 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 packing with a new part, then repeat Steps 3 to 6 to install the filter cartridge.

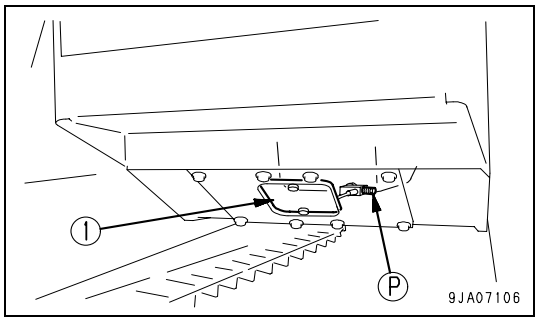
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

⚠ WARNING

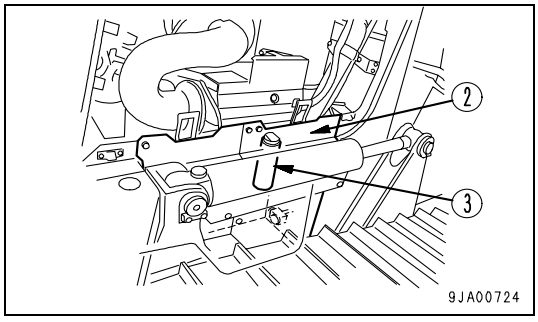
Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.

- Refill capacity: 19 liters (5.02 US gal)
- Prepare a socket wrench and filter wrench.

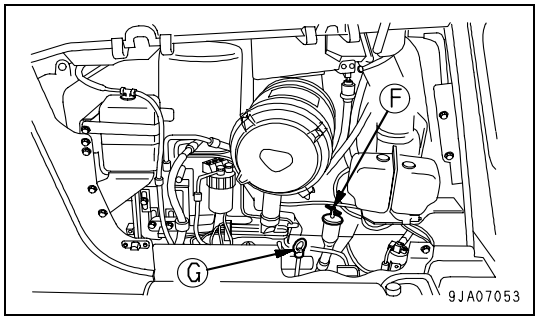
1. Remove inspection cover (1) at the front of the machine.
2. Set a container under the drain hose to catch the oil, then loosen drain valve (P) slowly and drain the oil. When doing this, be careful not to get oil over yourself.
3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
4. Tighten drain valve (P).



5. Open the engine side cover on the right side of the machine body, and remove filter cover (2) from the lower section.
6. Using a filter wrench, turn filter cartridge (3) counterclockwise to remove it.

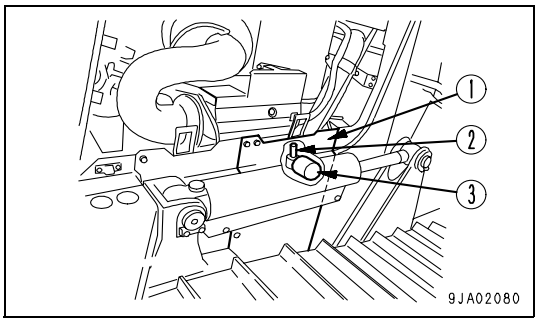


7. Clean the filter holder, fill the new filter cartridge with clean oil, coat the thread and packing portion of the new filter cartridge with oil (or coat thinly with grease), then install.
8. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 to 1 turn.
9. After replacing the filter cartridge, add engine oil through oil filler port (F) so that the oil level is between the MAX and MIN marks on dipstick (G).
10. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see “CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (3-75)“.



REPLACE CORROSION RESISTOR CARTRIDGE

1. Open the engine side cover on the right side of the machine body, and remove filter cover (1) from the lower section.
2. Screw in valve (2) at the top of the corrosion resistor.
3. Using the filter wrench, turn cartridge (3) counterclockwise to remove it.
4. Apply engine oil to the sealing surface of a new cartridge, then install it to the filter holder.



5. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 2/3 turn.
6. Open valve (1).

   Use Komatsu genuine cartridge.

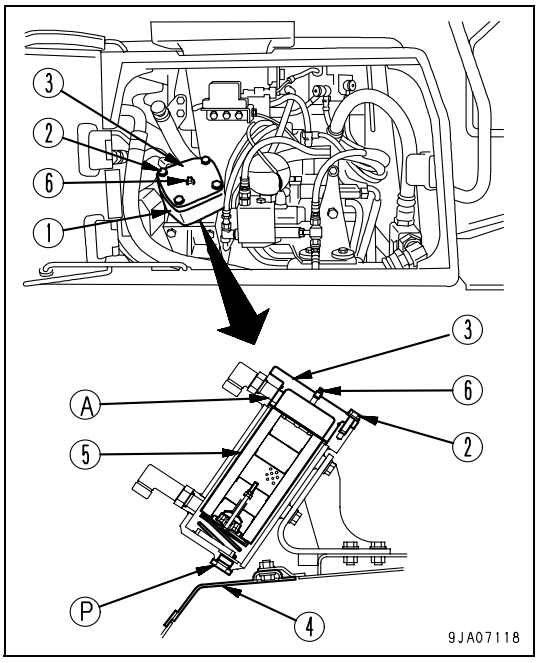
REPLACE POWER TRAIN OIL FILTER ELEMENT

⚠ WARNING

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

1. Open cover on the right side of the machine.
2. Remove mounting bolts (2) of filter (1), then remove cover (3).
3. Remove the cover (4) under the fender, loosen drain plug (P), and drain the oil inside the filter case.
4. Take out element (5).
5. Clean the removed parts and the inside of the case, then install a new element.

   Use Komatsu genuine element.
6. Set so that the side hole of cover (3) is in the direction to match hole (A) of filter case (1), then tighten with bolts (2).
7. Install drain plug (P).
8. Loosen air bleed plug (6), start the engine, and when oil spurts out, tighten the plug.
9. Close the cover at right side of machine.



EVERY 1000 HOURS SERVICE

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

CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (POWER TRAIN STRAINER, SCAVENGING PUMP STRAINER)

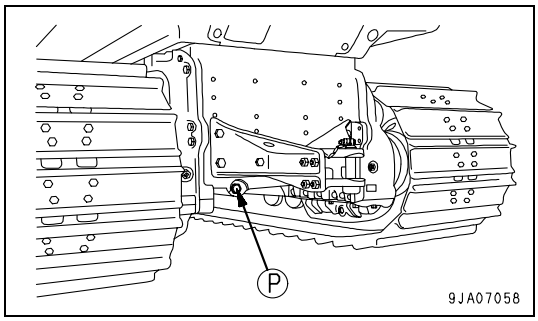
⚠ WARNING

- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.**
- **The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.**

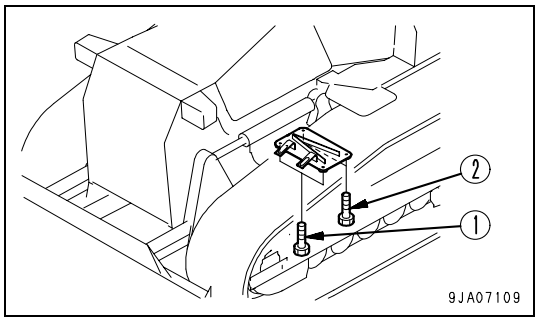
- Refill, capacity: 69 liters (18.22 US gal)

1. Loosen drain plug (P) (with a slit), drain the oil, then tighten drain plug (P) again.

   Do not remove drain plug (P).



2. Remove the undercover from the rear bottom of the machine body as follows.
3. Remove two bolts (1) from the front side of the machine body.
4. Holding the cover, remove two bolts (2) from the rear side of the machine body.

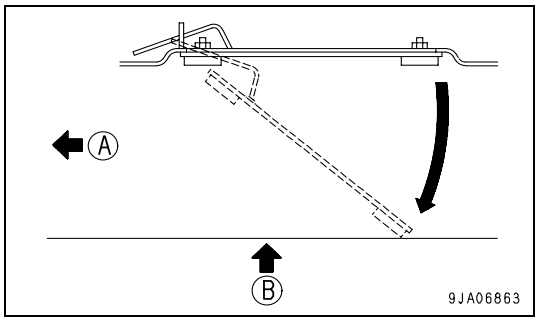


5. Lower and open the cover gradually.

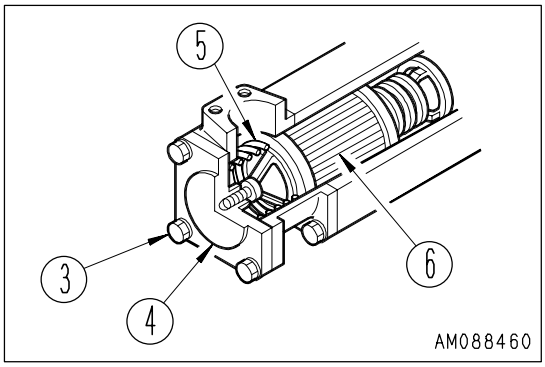
   Weight of undercover: 21 kg (46 lb)

   (A) Front of machine

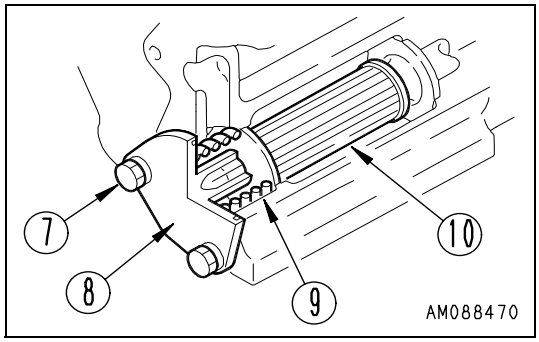
   (B) Dangerous place



6. Loosen mounting bolt (3) of the power train strainer, then remove cover (4).
7. Take out spring (5), then take out strainer (6).
8. Remove all dirt from strainer (6), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.

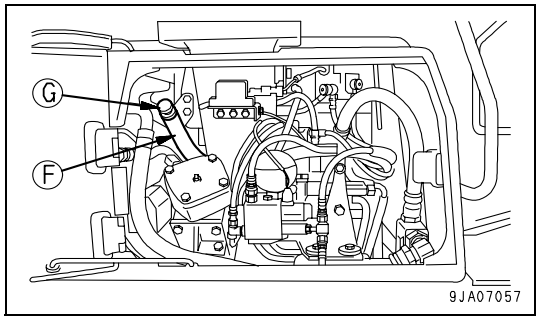


9. Loosen mounting bolt (7) of the scavenging pump strainer, then remove cover (8).
10. Take out spring (9), then take out strainer (10).
11. Remove all dirt from strainer (10), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.



If the spring or strainer are damaged, replace them.

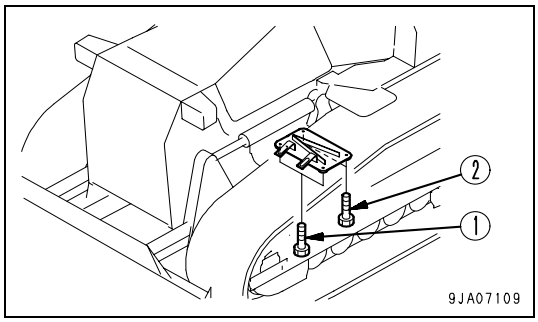
12. Install the strainers to their original position.
13. After installing, replace the element in the power train oil filter. For details, see “REPLACE POWER TRAIN OIL FILTER ELEMENT (4-57)“.
14. Open cover on the right side of the machine.
15. Refill the specified quantity of oil through oil filler (F).
16. Check that the oil is at the specified level. For details, see “CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL (3-77)“.
17. Close the cover at right side of machine.



CHECK OIL LEVEL IN DAMPER CASE, ADD OIL

⚠ WARNING

- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.**
- **The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.**

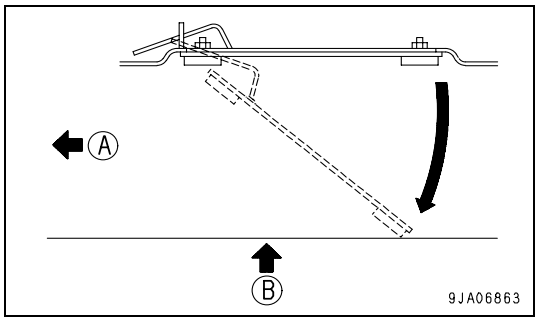


If the quantity of the oil in the damper is insufficient, the damper may be seized. Accordingly, check, and add or replace the oil according to the following procedure.

1. Remove the undercover from the rear bottom of the machine body as follows.
2. Remove two bolts (1) from the front side of the machine body.
3. Holding the cover, remove two bolts (2) from the rear side of the machine body.
4. Lower and open the cover gradually.

   (A) Front of machine

   (B) Dangerous place



5. Remove oil level plug (3) and check the oil level. The proper oil level is the bottom edge of the plug hole.

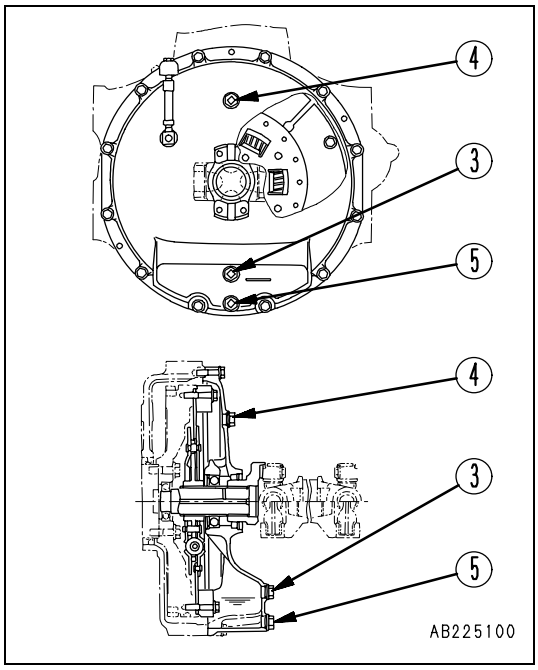
   Tighten plug (3).

REMARK
Check the oil level while the engine is stopped.
If the machine is inclined, set it in a level position before checking the oil level.

6. If the oil level is below the bottom edge of the plug hole, remove oil filler plug (4) and add new oil.

   Add new oil until the oil level reaches the bottom edge of oil level plug (3).

7. After adding the oil, tighten plugs (3) and (4).



CHANGE OIL IN FINAL DRIVE CASE

⚠ WARNING

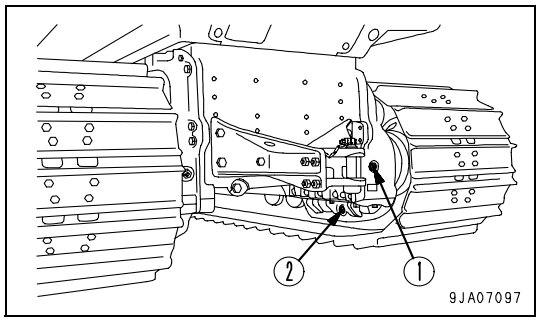
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

- Refill capacity

  D61EX: (each) 24 liters (6.34 US gal)

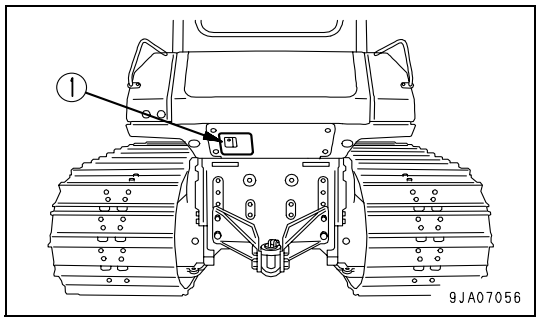
  D61PX: (each) 27 liters (7.13 US gal)

1. Remove oil level plug (1) , then remove drain plugs (2), and drain the oil. After draining the oil, tighten the plugs.
2. Add engine oil to the refill level through the hole in oil level plug (1).
3. Check that the oil is at the specified level. For details, see “CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL (4-48)“.

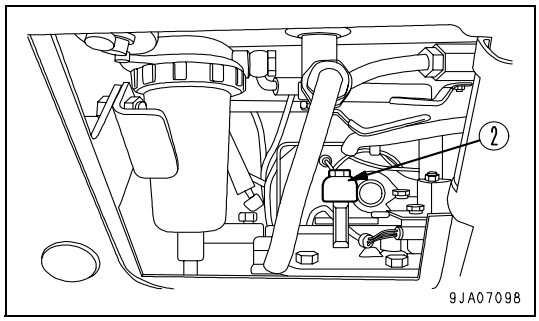


CLEAN BREATHER

1. Open cover (1).



2. Remove the breather (2) and wash out dust remaining inside with diesel oil and flushing oil.



CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor to have the rotor play checked.

CHECK FOR LOOSE ROPS MOUNT BOLTS

Check that the bolts are not loose and that there is no damage.

If any bolt is loose, tighten it to the following torque.

If there is any damage, replace the bolt with a genuine Komatsu part.

Tightening torque: 785 to 980 N·m (80 to 100 kgf·m, 578.6 to 723.3 lbft)

EVERY 2000 HOURS SERVICE

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

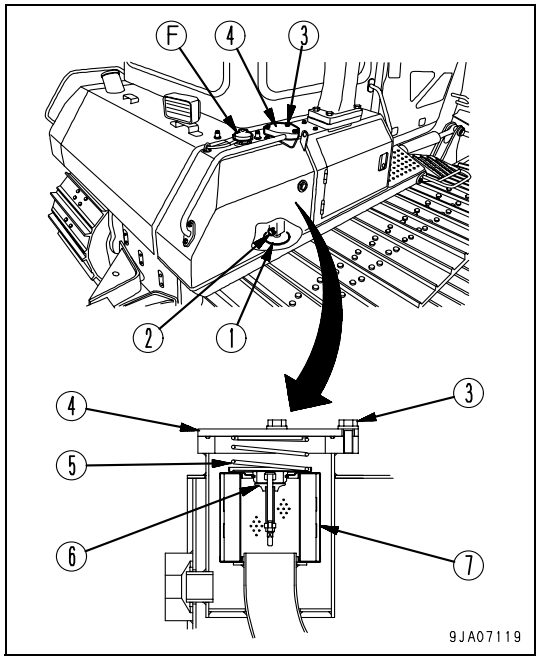
CHANGE OIL IN HYDRAULIC TANK, REPLACE OIL FILTER ELEMENT

⚠ 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.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

- Refill capacity: 44 liters (11.62 US gal)

1. Lower the work equipment to the ground, then stop the engine.
2. Turn the cap of oil filler (F) slowly to release the internal pressure, then remove the cap.
3. Remove the cover (1) at the bottom of the hydraulic tank.
4. Loosen drain valve (2), drain the oil, tighten drain valve (2) again, then install cover (1). When loosening drain valve (2), be careful not to get oil on yourself.
5. Remove bolt (3), then remove cover (4).
6. Take out spring (5), valve (6), and element (7).
7. Clean the inside of the case, then wash spring (5) and valve (6).
8. Install new element (7), valve (6), and spring (5).
9. Install cover (4) with bolt (3).
10. Refill the specified quantity of oil through oil filler (F).
11. Check that the oil is at the specified level. For details, see “CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (4-48)“.

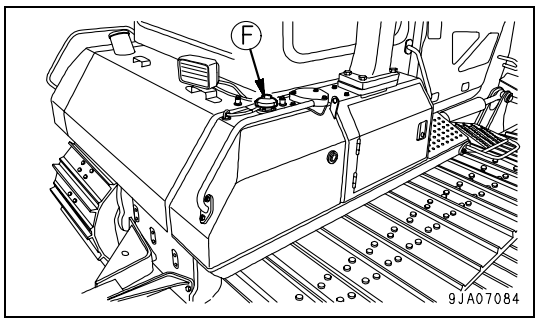


REPLACE HYDRAULIC TANK BREATHER ELEMENT

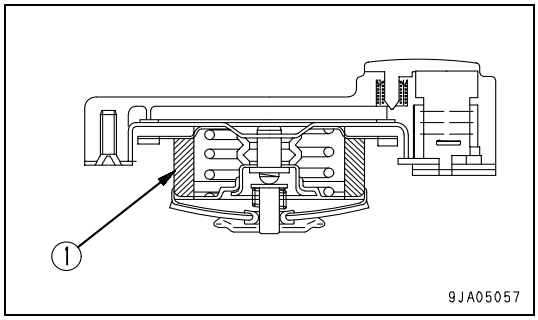
⚠ WARNING

- **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.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

1. Remove the cap of oil filler (F) at the top of the hydraulic tank.



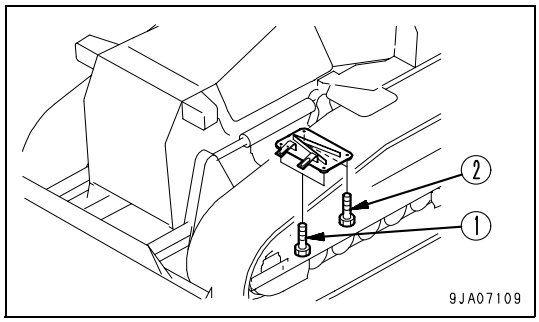
2. Replace element (1) inside the cap.



CHANGE OIL IN DAMPER CASE

⚠ WARNING

- **The parts and oil is very hot just after the operation. Wait until the oil temperature drops, then start the work.**
- **The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.**
- **When removing drain plug (5) of the damper case, take care not to get oil over yourself.**



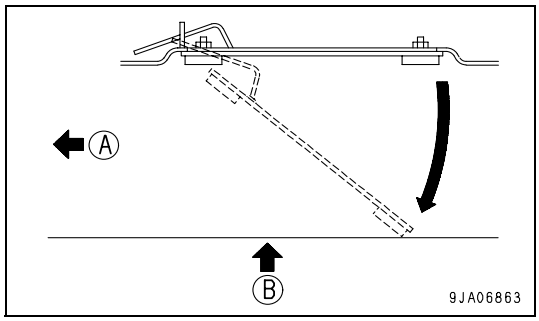
- Quantity of replacement oil: 1.3 liters (0.34 US gal)

1. Remove the undercover from the rear bottom of the machine body as follows.
2. Remove two bolts (1) from the front side of the machine body.
3. Holding the cover, remove two bolts (2) from the rear side of the machine body.
4. Lower and open the cover gradually.

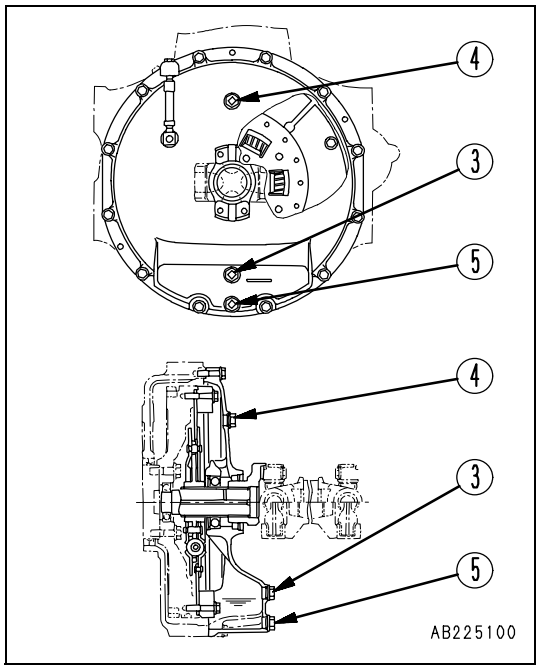
   Weight of undercover: 21 kg (46 lb)

   (A) Front of machine

   (B) Dangerous place



5. Remove oil level plug (3) and oil filler plug (4), then remove drain plug 5 to drain the oil. After the all oil is drained, tighten plug (5).
6. Add oil through the hole of oil filler plug (4) until the oil level reaches the bottom edge of the hole of oil level plug (3).
7. After refilling the oil, tighten plugs (3) and (4).



CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning and inspection.

CHECK VIBRATION DAMPER

Check that there are no cracks or peeling in the outside surface of the rubber.

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

CHECK ALTERNATOR, STARTING MOTOR

The brushes mat be worn or the bearing may have run out of grease, contact your Komatsu distributor for inspection and repairs.

If the engine is started frequently, have this inspection carried out every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

Special tools are needed for inspection and maintenance, please contact your Komatsu distributor.

EVERY 4000 HOURS SERVICE

Maintenance for every 50, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

CHECK WATER PUMP

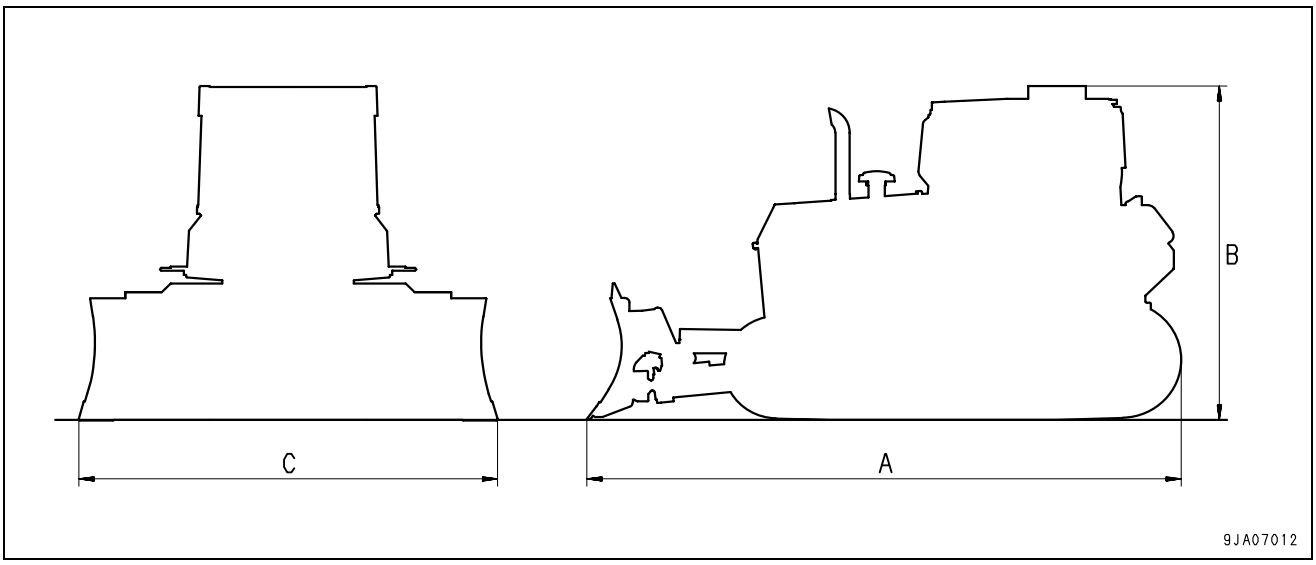
Check that there is no play in the pulley, leakage of oil or water, or clogging of the drain hole. If any abnormality is found, please contact your Komatsu distributor for repairs or replacement.

SPECIFICATIONS

SPECIFICATIONS

Power angle power tiltdozer, ROPS guard, cab, air conditioner

	Item		Unit	D61EX-15	D61PX-15
	Machine weight		kg (lb)	16,840 (37,132)	18,460 (40,704)
	Name of engine		-	Komatsu SA6D114E-2 diesel engine	
	Engine horsepower		kW(HP)/rpm	116(155)/1,800	
A	Overall length		mm (ft in)	5,030 (16'6“)	5,465 (17'11“)
B	Overall height		mm (ft in)	3,150 (10'4“)	3,180 (10'5“)
C	Overall width		mm (ft in)	3,275 (10'9“)	3,860 (12'8“)
	Travel speed (1st/2nd/3rd)	Forward	km/h (MPH)	3.3/5.8/9.4 (2.1/3.6/5.8)	
		Reverse	km/h (MPH)	4.3/7.3/11.2 (2.7/4.5/7.0)	



ATTACHMENTS, OPTIONS

⚠ WARNING

Please read and make sure that you understand the SAFETY section before reading this section.

GENERAL PRECAUTIONS

PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.

⚠ WARNING

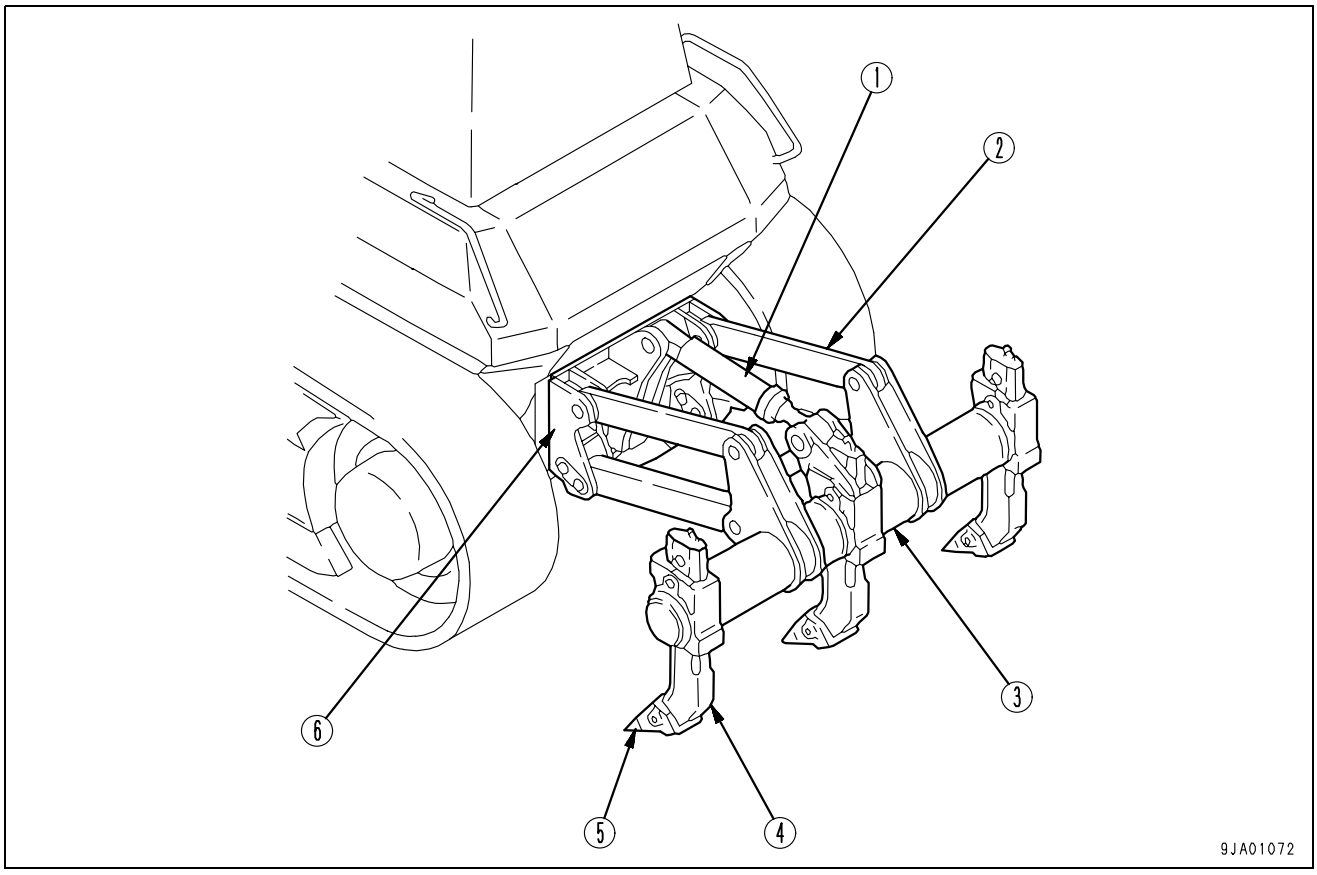
General precautions
Read the instruction manual for the attachment carefully, and do not use the machine before you understand the operation method completely.
If you lose the instruction manual, be sure to order another copy from your Komatsu distributor.
To prevent serious personal injury caused by misoperation, place your foot on the pedal only when operating the pedal.
Precautions for removal and installation
When removing or installing an attachment, observe the following items and work safely.
Select a firm, level surface when installing or removing an attachment.
When working in cooperation with one or more other workers, decide signs and observe them when carrying out the operation.
When carrying a heavy part (25 kg (55 lb) or more), use a crane.
When removing a heavy part, always place a support in position before removing it.
When lifting a load with a crane, be particularly careful of the center of gravity.
It is dangerous to carry out operations when the load has been raised by a crane. Always lower the load onto a stand and check that it is safe.
When leaving an attachment removed or installing it, place it in a stable position to prevent it from falling over.
Never go under a load raised by a crane.
Always stand in a place which is safe even if the load should fall.

NOTICE
Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.
For details of removal and installation operations, contact your Komatsu distributor.

HANDLING HYDRAULIC RIPPER

- This ripper is applicable for the D61EX.
- When installing it to the D61PX, change the track shoes to 600 mm (23.6 in) narrow single shoes. If the ripper is operated on a machine equipped with wider track shoes, there is danger that the ripper will damage the undercarriage.

GENERAL VIEW



(1) Hydraulic cylider
(2) Link
(3) Beam
(4) Shank
(5) Point
(6) Support

EXPLANATION OF COMPONENTS

RIPPER CONTROL LEVER

⚠ WARNING

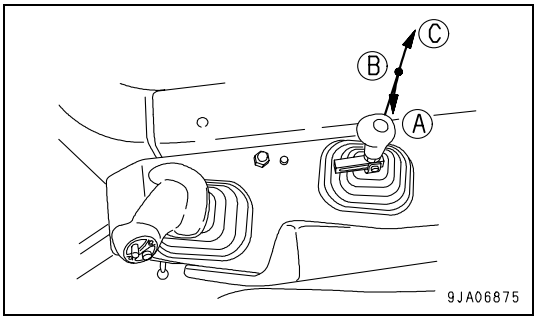
When carrying out inspection or maintenance of the machine, or when parking the machine, lower the ripper to the ground and set the work equipment lock lever to the LOCK position.

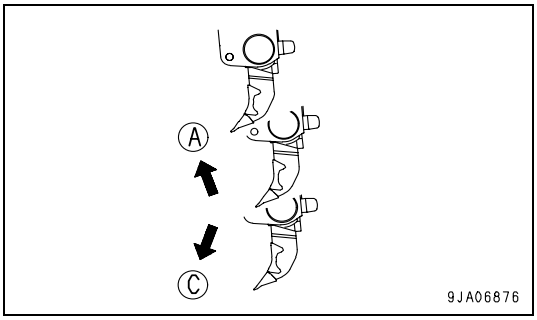
This lever is used to operate the ripper.

(A) RAISE: Ripper goes up

(B) HOLD: Ripper is stopped and held in the same position.

(C) LOWER: Ripper goes down

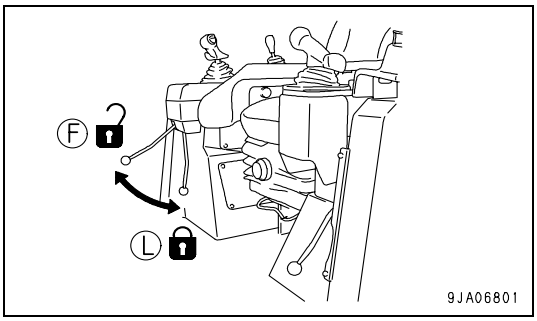




REMARK

If the work equipment lock lever is set to LOCK position (L), the operation of the ripper is locked.

For details of the operation of the work equipment lock lever, see “WORK EQUIPMENT LOCK LEVER (3-37)“.



OPERATION

CHECK BEFORE STARTING ENGINE, ADJUST

WALK-AROUND CHECK

1. Check for wear of the point at the tip of the shank, check the mounting condition, and check for damage to the rivets. If any abnormality is found, replace or repair.

PRECAUTIONS WHEN OPERATING

- Travel in low speed and lower the ripper gradually when starting to move the machine off. When the optimum digging depth is reached, move the control lever to the HOLD position.

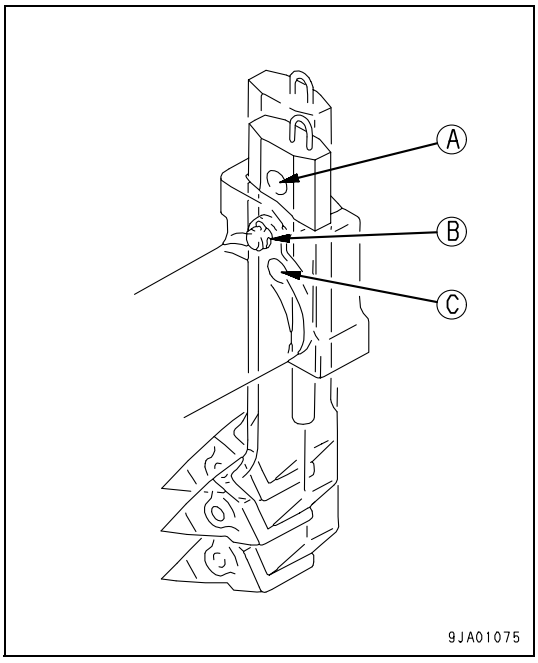
  Do not dig the shank in deep when starting digging operations.
- During ripping operations, never turn the machine suddenly or travel in reverse. When turning the machine suddenly or traveling in reverse, raise the shank from the ground surface.
- When carrying out digging operations with only one shank, always use the center shank. Remove both side shanks.
- When starting to travel up a steep slope or when reaching the bottom of the slope, the point may touch the ground. On hard ground, there is danger of the point breaking if it touches the ground, so raise the shank to the maximum height.

ADJUSTING POSTURE OF WORK EQUIPMENT

ADJUSTMENT OF DIGGING DEPTH

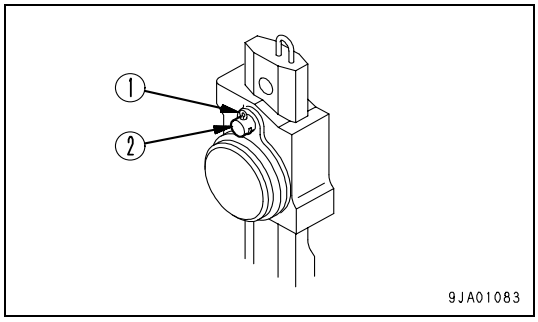
There are mounting holes for the pin in the shank. Select the mounting hole to match the digging depth.

Pin hole position	Use	Max. digging depth
(A)	When there is special need to dig deeply	595mm (23.4 in)
(B)	Normal	485mm (21.9 in)
(C)	When not using ripper	-



When changing the digging depth, do as follows.

1. Remove cotter pin (1).
2. Remove pin (2), change the position of the shank hole, then insert pin (2).
3. Insert cotter pin (1).



ADJUSTING DIGGING ANGLE

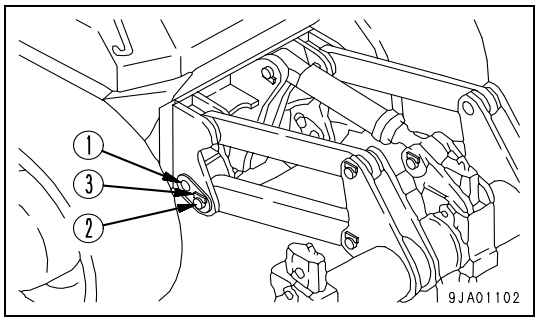
Adjust the position of the mounting pin hole in the beam and upper link.

- Digging angle

  Position (1): 45°

  Position (2): 55°

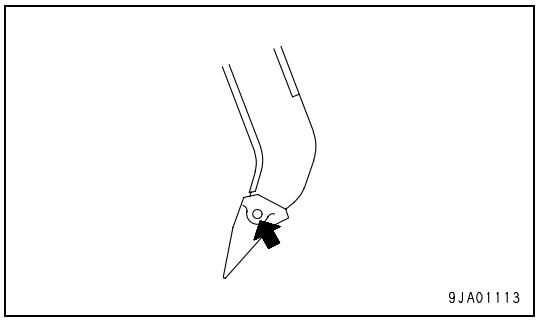
The pin is locked with lock plate (3).



REPLACEMENT OF POINT

A point is installed to protect the shank. If the point is worn, replace it as follows.

1. Put a pin remover in contact with the pin marked by the arrow and tap with a hammer to remove.
2. Replace the point.
3. Insert the pin half way, then knock it in fully with a hammer.



TROUBLESHOOTING

OTHER TROUBLE

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problem or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Slow ripper raising and function, lack of ripping force	•Improper hydraulic oil	•Add oil to specified level, see EVERY 250 HOURS SERVICE
	•Defective pump	(•Check, repair)
	•Defective adjustment of relief valve	(•Check, repair)
	•Defective control valve, safety valve •Defective valve spool	(•Check, repair)
	•Defective piston ring, packing, valve	(•Check, repair)
	•Clogging inside piping	(•Check, repair)
Cylinder lacks holding power	•Leakage of oil from piping, hose	•Tighten
	•Defective piston ring, packing	(•Replace)
	•Defective piston valve	(•Check, repair)
	•Defective valve spool	(•Check, repair)
	•Defective safety valve, suction valve	(•Check, repair)
Oil pressure does not rise	•Clogging inside piping	(•Repair)
	•Defective adjustment of relief valve	(•Check, adjust)

MAINTENANCE

EVERY 250 HOURS SERVICE

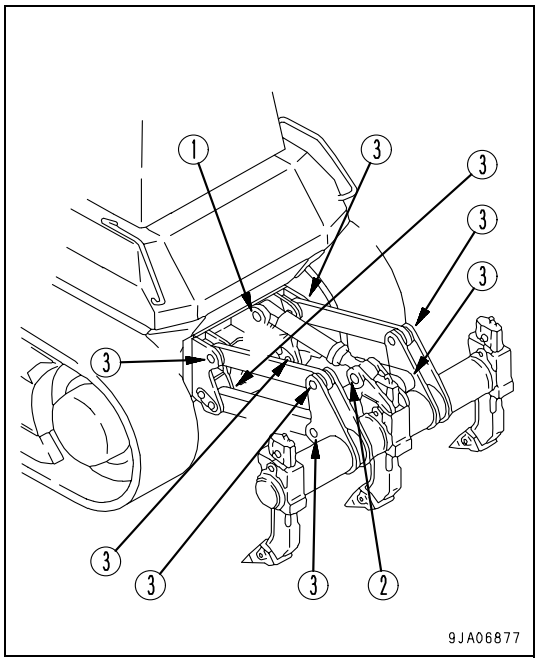
LUBRICATING

1. Lower the ripper to the ground and stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

(1) Ripper cylinder foot pin (1 place)

(2) Ripper cylinder rod end pin (1 place)

(3) Link pin (8 places)



CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

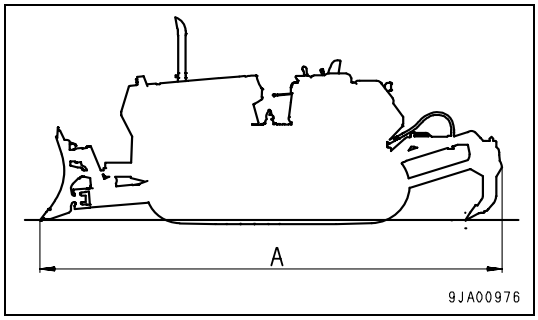
1. Stop the machine on level ground.

   Set the blade perpendicular and lower it the ground, lower the ripper to the ground, then stop the engine.
2. For details of checking the oil level in the hydraulic tank, see “CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (4-48)“.

SPECIFICATIONS

- Power angle, power tilt dozer

	Item	Unit	D61EX-15
	Operating weight (not including operator)	kg (lb)	17,670 (38,962)
	Weight of ripper as individual part	kg (lb)	1,610 (3,550)
A	Overall length	mm(ft in)	6,285 (20'7“)
	No. of shanks		3



AIR SUSPENSION SEAT

ADJUSTMENT

⚠ WARNING

When adjusting the position of the operator's seat, always set the work equipment lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

NOTICE
There is danger of damage to the air compressor, so do not keep lever (3) operated continuously for more than 1 minute.

Adjustments (C), (D), and (I) use the air compressor built into the seat, so turn the engine starting switch to the ON position when carrying out the adjustment.

(A) Fore-and-aft adjustment

Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 170 mm (6.7 in) (17 stages)

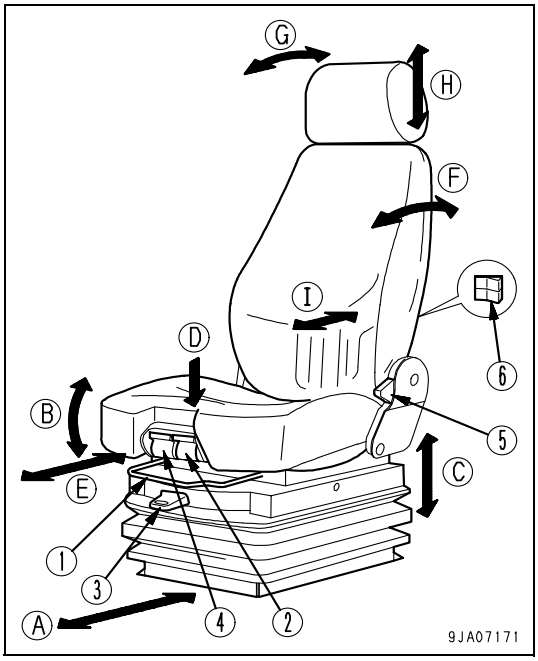
(B) Adjusting seat angle

Move lever (2) up, move the seat cushion at the front up or down to set to the desired position, then release the lever.

Amount of adjustment

Forward tilt: 3 degrees

Rear tilt: 11 degrees



(C) Adjusting seat height

The seat height adjustment uses an air system, and it can be adjusted steplessly.

When adjusting the height, pull lever (3) up fully or push it down fully (when pulling it up, pull it until a click is felt). When the seat is set at the desired height, release the lever. If the lever is kept pulled up, the position where the seat does not rise any further is the maximum height. When the seat reaches the maximum height, the suspension automatically goes down slightly to secure the amount of movement of the lever.

If the operator raises his body from the seat or changes the amount of weight applied to the seat during adjustment, the air in the suspension may be discharged.

Amount of adjustment: 80 mm (3.2 in)

(D) Setting seat for weight

Pull lever (3) up fully (pull it until a click can be felt). When the lever is released, the weight adjustment is carried out automatically. To ensure that the weight adjustment is carried out correctly, the operator should sit in the normal operating position when operating the lever. If the operator raises his body from the seat or changes the amount of weight applied to the seat during adjustment, the air in the suspension may be discharged.

When operators change shifts, the new operator should pull lever (3) up fully (pull it until a click it is felt). When the lever is released, the weight adjustment is carried out automatically.

If lever (3) is pulled lightly, the weight adjustment starts, but always pull the lever up fully (pull it until a click is felt) before releasing it.

(E) Fore-and-aft adjustment of seat cushion

Operate lever (4) up, set the seat cushion to the desired position, then release the lever.

Fore-and-aft adjustment: 60 mm (2.4 in)

(F) Adjusting reclining angle

Move lever (5) up and move the backrest to the front or rear.

Push your back against the backrest when carrying out this adjustment. If your back is not pressing against the backrest, the backrest may suddenly spring forward.

Amount of adjustment

Forward tilt: 20 degrees (over 20 degrees is free)

Rear tilt: 60 degrees

REMARK
The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

NOTICE
If the seat back is reclined too far, the seat back may hit the rear glass, so use it in a position where it does not contact the glass.

(G) Adjusting headrest angle

Rotate the backrest to the front or rear and set to the desired angle.

Amount of adjustment: 38 degrees

(H) Adjusting headrest height

Move the headrest up or down and set to the desired height.

Amount of adjustment: 100 mm (3.9 in)

(I) Lumbar support

Operate switch (6) to give a suitable tension to the lumbar region.

When + is pressed: Tension becomes stronger

When - is pressed: Tension becomes weaker

DELUXE SEAT

(Rotating seat)

ADJUSTMENT

⚠ WARNING

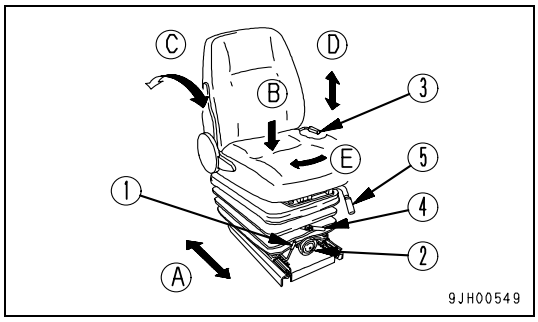
When adjusting the position of the operator's seat, always set the work equipment lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

(A) Fore-and-aft adjustment

Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm (6.3 in) (8 stages)



(B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted within a range of 50 to 120 kg (110 to 265 lb)

If you want to make the seat softer, turn the weight adjustment to a lower weight; if you want to make the seat harder, adjust to a higher weight.When operating on uneven surfaces, adjust the seat to a harder setting.

(C) Adjust reclining angle

NOTICE
When reclining the seat back to the rear, check the space behind, and adjust to a suitable position.

Pull lever (3), set the seatback to a position where it is easy to operate, then release the lever.

(D) Height adjustment of seat

- Turn lever (4) to adjust the height of the seat.
- If the lever is turned clockwise, the seat is heightened. If the former is turn counterclockwise, the latter is lowered.

  If you apply your weight to the seat, the lever becomes heavy. Accordingly, do not apply your weight.

  After adjusting the height, release the lever to lock the seat.

  (Height adjustment distance: Stepless, 50 mm (2.0 in))

(E) Adjusting direction of seat

Pull up lever (5) to unlock the seat, and the seat can be turned by hand to the position of 15° on the right.

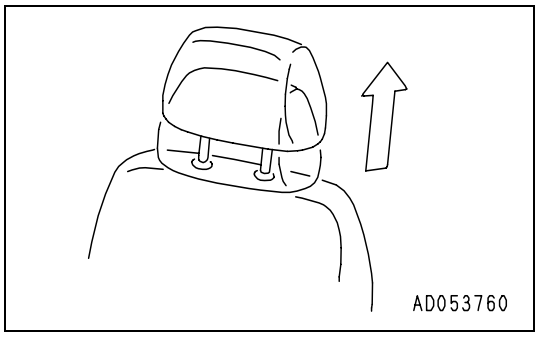
After changing the direction of the seat, return the lever securely to lock the seat.

- Change the direction of the seat to the right for the ease of operation of the ripper.

HEADREST

Removal of headrest

Pull up the headrest.



REMARK
The headrest cannot be fixed to halfway.

EQUIPPING FIRE EXTINGUISHER AND FIRST-AID KIT

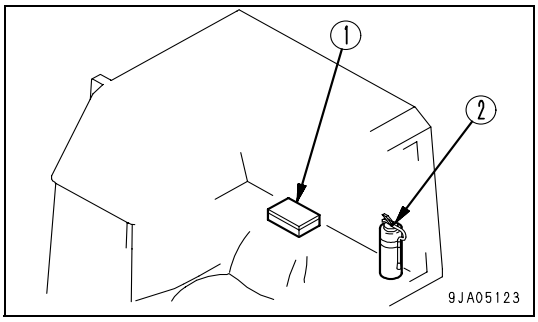
Equipping the fire extinguisher and the first-aid kit at the illustrated position needs brackets (if equipped).

The fire extinguisher and the first-aid kit can be installed to the positions shown in the following illustration.

(1) First-aid kit

(2) Fire extinguisher

For parts that are required to install them in your machine, please contact your distributor.



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COLOPHON

D61EX-15 , D61PX-15 GALEO BULLDOZER
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