

Operation & Maintenance Manual

D61EX-12 D61PX-12

BULLDOZER

SERIAL NUMBERS D61EX-12 - 1106 and up
D61PX-12 - 1112

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

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 hazard when performing operation and maintenance.

WARNING

Operators and maintenance personnel must always do as follows before beginning operation or maintenance.

- **Always be sure to read and understand this manual thoroughly before performing operation and maintenance.**
- **Read the safety messages given in this manual and the safety labels affixed to the machine thoroughly and be sure that you understand them fully.**

Keep this manual at the storage location for the Operation and Maintenance Manual given below, and have all personnel read it periodically.

If this manual has been lost or has become dirty and cannot be read, request a replacement manual immediately from Komatsu or your Komatsu distributor.

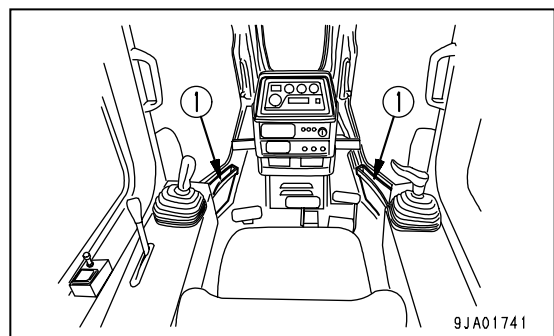
If you sell the machine, be sure to give this manual to the new owners together with the machine.

Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.

Storage location for the Operation and Maintenance Manual:

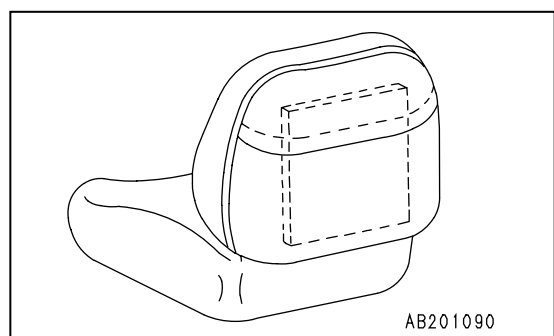
Machine equipped with cab

Inside of right and left doors



Machine without cab

Back pocket of operator's seat



EMISSION CONTROL WARRANTY

EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)

1. Products Warranted

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

2. Coverage

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

3. Limitations

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

KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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

GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS

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

1. Produits garantis:

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

2. Couverture:

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

3. Limitations:

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

INFORMATION IMPORTANTE SUR LE MOTEUR

CE MOTEUR EST CONFORME AUX NORMES AMÉRICAINES DE L'EPA (ANNÉE DU MODÈLE) ET DE LA CALIFORNIE POUR LES MOTEURS LARGES NON-ROUTIERS À IGNITION PAR COMPRESSION. CE MOTEUR EST CERTIFIÉ POUR OPÉRER À ESSENCE DIÉSEL.

AVERTISSEMENT

DES BLESSURES PEUVENT RÉSULTER ET LA GARANTIE S'ANNULER SI LES RPM DU TAUX D'ESSENCE OU L'ALTITUDE EXCÈDENT LES VALEURS MAXIMALES PUBLIÉES POUR CE MODÈLE ET SON APPLICATION.

IMPORTANT ENGINE INFORMATION

THIS ENGINE CONFORMS TO YYYY MODEL YEAR U.S. EPA REGULATION AND THE CALIFORNIA REGULATIONS LARGE NON ROAD COMPRESSION IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON DIESEL FUEL.

WARNING

INJURY MAY RESULT AND WARRANTY IS VOIDED IF FUEL RATE RPM OR ALTITUDES EXCEED PUBLISHED MAXIMUM VALUES FOR THIS MODEL AND APPLICATION.

ENGINE MODEL	SERIAL NO.	DISPLACEMENT	LITERS
ENGINE FAMILY		FIRING ORDER	1 - 5 - 3 - 6 - 2 - 4
EXHAUST EMISSION CONTROL SYSTEM			
ADV. LOAD OUTPUT	Kw (HP)	RPM	
VALVE LASH COLD (mm)	IN.	EX. FUEL RATE AT ADV.	mm ³ /STROKE
IDLE SPEED		RPM	
INITIAL INJECTION TIMING	DEG. BTDC	FAMILY EMISSION LIMIT	
		DATE OF MANUFACTURE	
		KOMATSU LTD. MADE IN JAPAN	

MODÈLE DU MOTEUR

FAMILLE DU MOTEUR

SYSTÈME DE CONTRÔLE DES ÉMISSIONS D'ÉCHAPPEMENT

CHARGE DE SORTIE ADV.

PORTÉE DE VALVE À FROID (mm)

VITESSE STATIQUE

RÉGLAGE DE L'ALLUMAGE - INJECTION INITIALE

DEG. BTDC

NO. SÉRIE

DÉPLACEMENT

LITRES

SÉQUENCE DE MISE À FEU

mm³/BATTEMENT

TAUX D'ESSENCE À ADV.

LIMITE D'ÉMISSION DE LA FAMILLE

DATE DE FABRICATION

KOMATSU LTD.
FABRIQUÉ AU JAPON

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. This signal word is to be limited to most extreme situations.

⚠ 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. It may also be used to alert against unsafe practices.

Example of safety message using signal word

⚠ WARNING

To avoid hitting unlocked operation levers, lower equipment to ground and move SAFETY LOCK LEVER (located near seat) to LOCK position before starting up from operator's seat. Sudden and unwanted machine movement can cause 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.

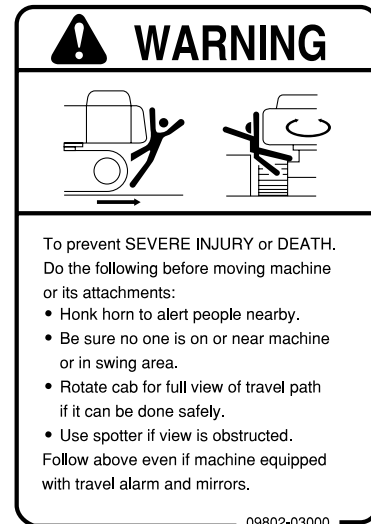
REMARKS This gives information that is useful to know.

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



Part No.

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.



Part No.

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))

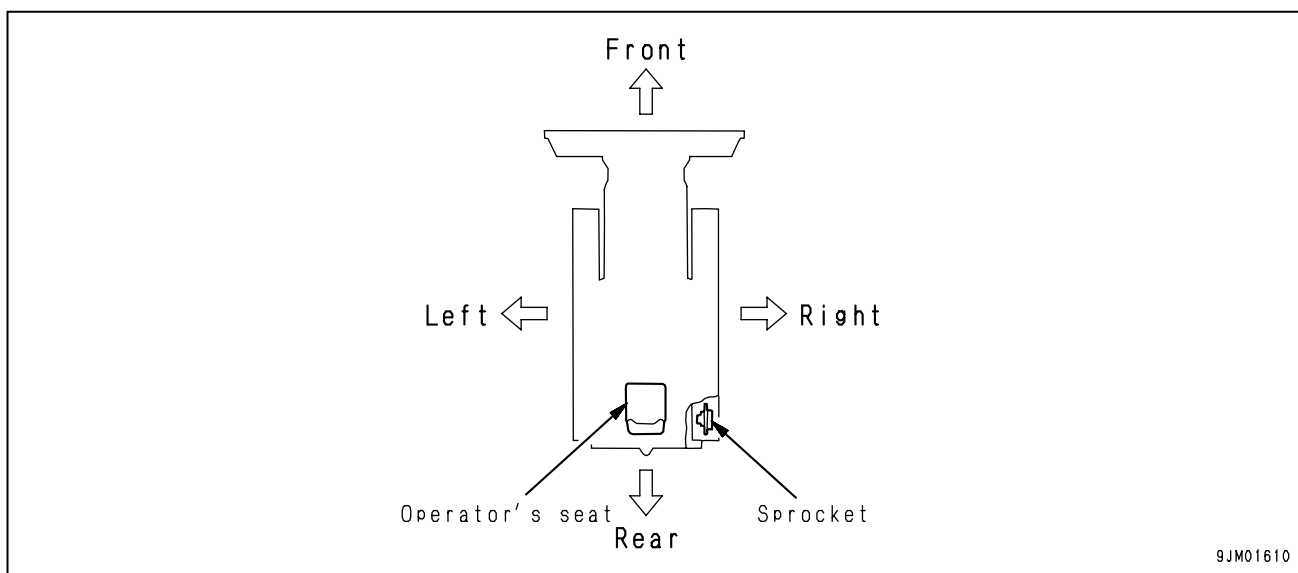
INTRODUCTION

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

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

See the section "WORK POSSIBLE USING BULLDOZER (PAGE 3-77)" for further details.

FRONT/REAR, LEFT/RIGHT DIRECTIONS OF MACHINE



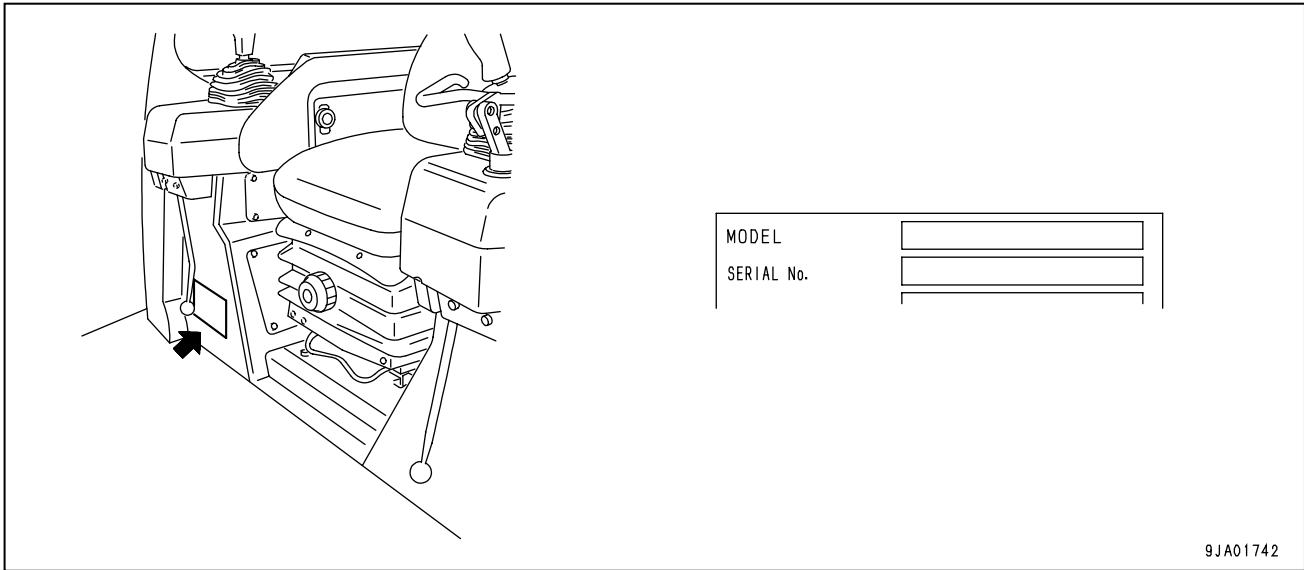
In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's cab when the operator's cab is facing the front and the sprocket is at the rear of the machine.

NECESSARY INFORMATION

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

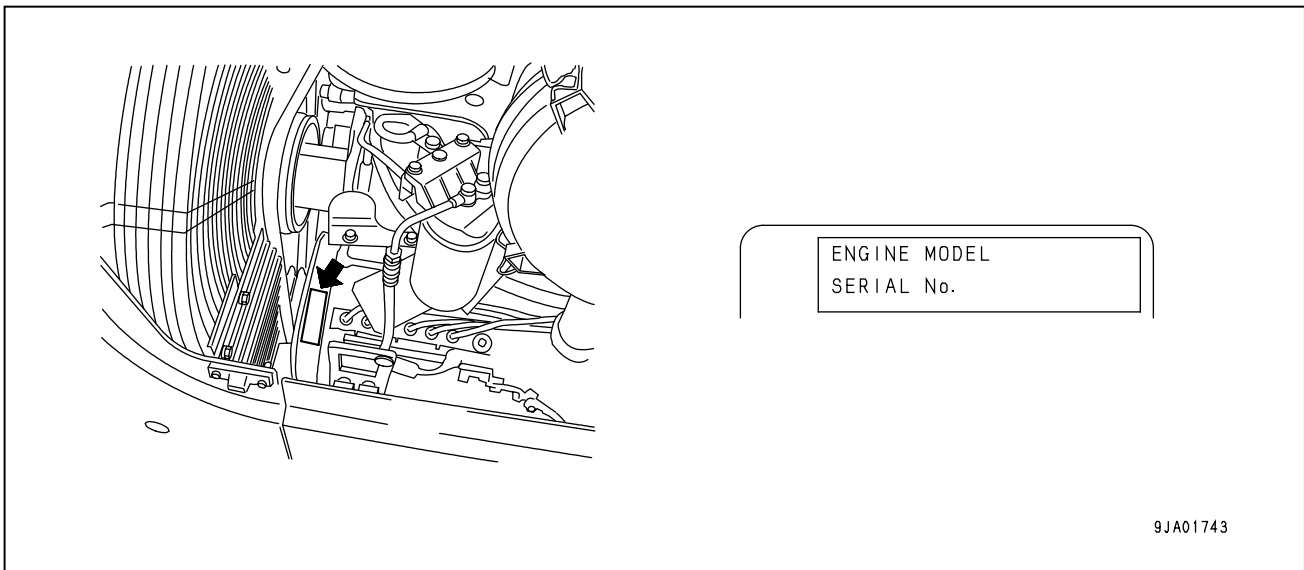
MACHINE SERIAL NO. PLATE AND POSITION

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



ENGINE SERIAL NO. PLATE AND POSITION

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



POSITION OF SERVICE METER

This is at the left upper part of the monitor panel.

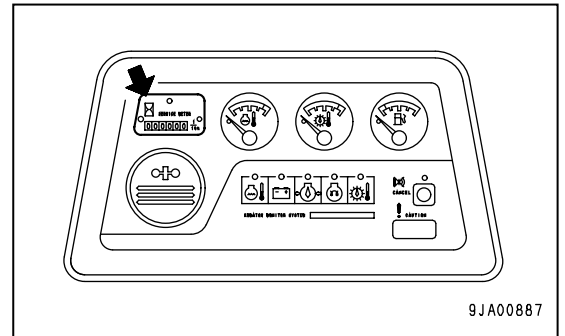


TABLE OF ENTER SERIAL NO. AND DISTRIBUTOR

Machine serial No.	
Engine serial No.	
Distributor name	
Address	-----

Service Personal	-----
Phone/Fax	-----

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MEMO

SAFETY

WARNING

Please be sure that you fully understand this manual and the precautions related to safety for the machine. When operating or servicing the machine, always follow these precautions strictly.

SAFETY

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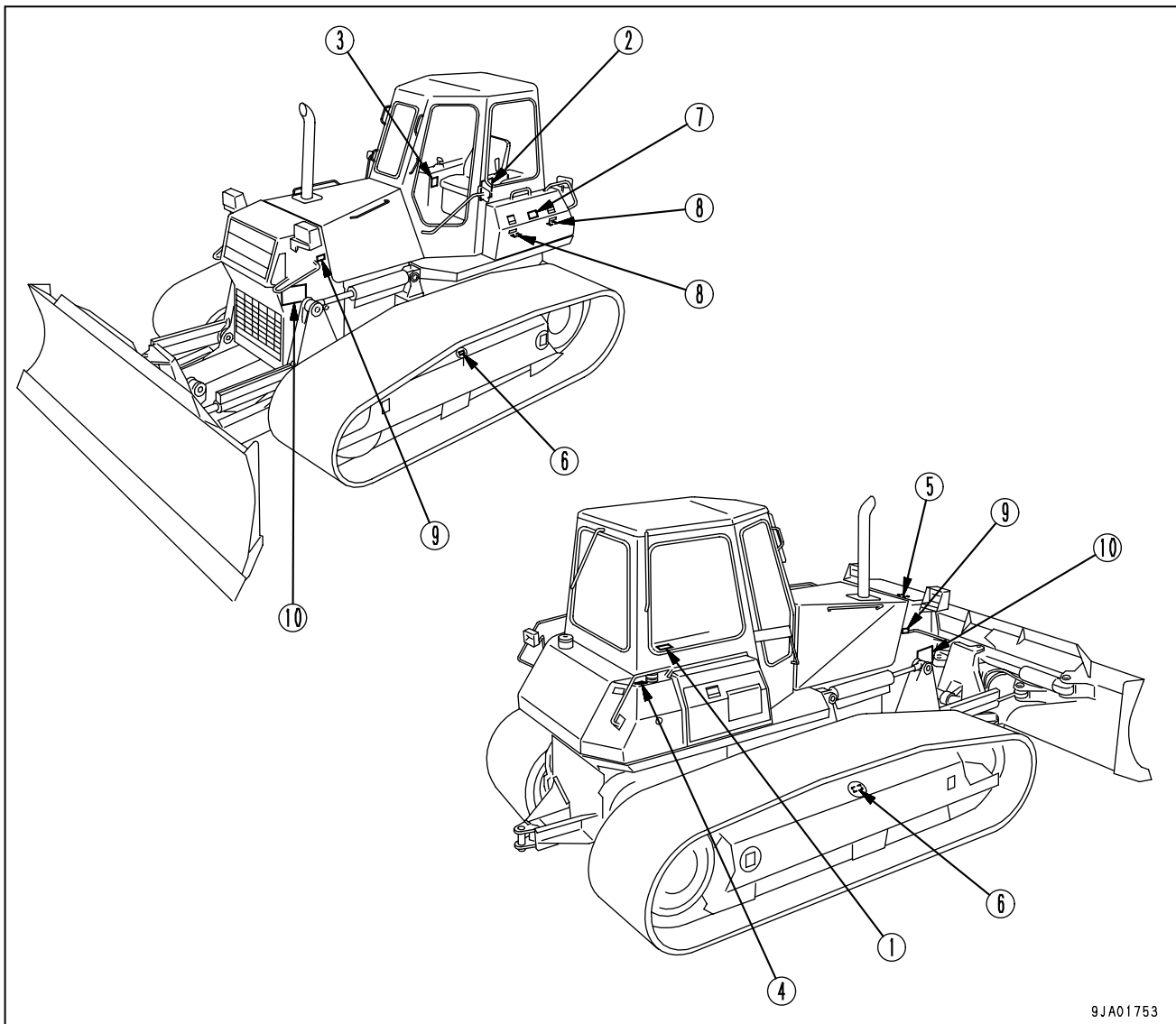
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SAFETY LABELS

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, there 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.

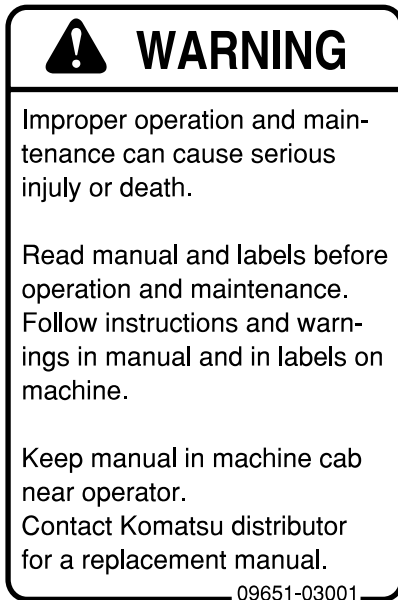
POSITIONS OF SAFETY PICTOGRAMS



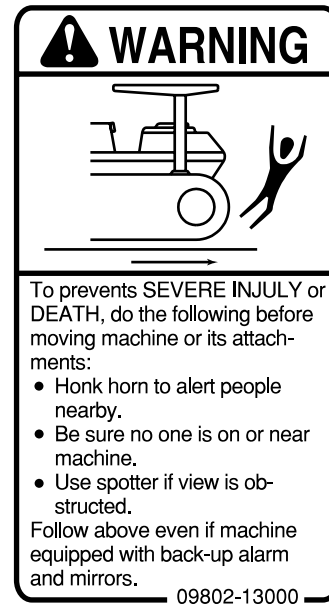
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SAFETY LABELS

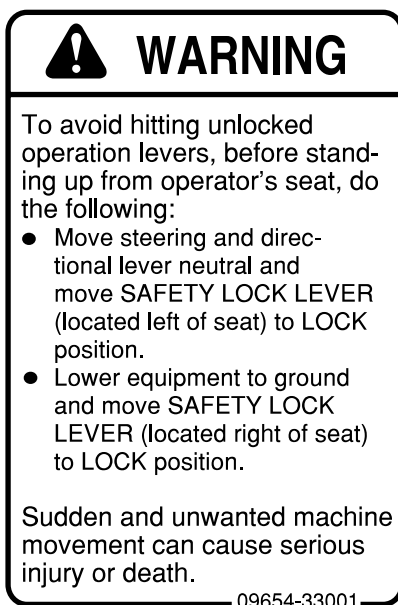
- (1) Precautions for operation, inspection and maintenance (09651-03001)



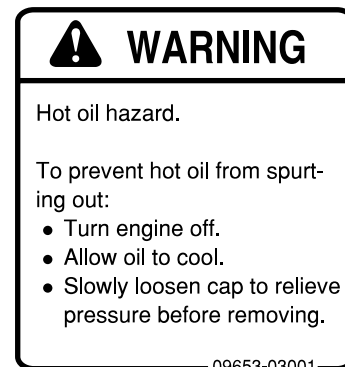
- (2) Precautions when traveling in reverse (09802-13000)



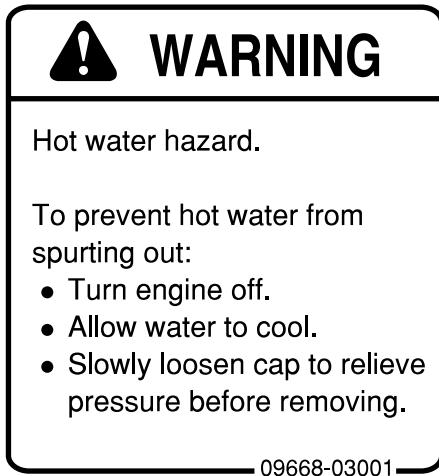
- (3) Precautions for leaving the operator's seat (09654-33001)



- (4) Precautions for high-temperature hydraulic oil (09653-03001)

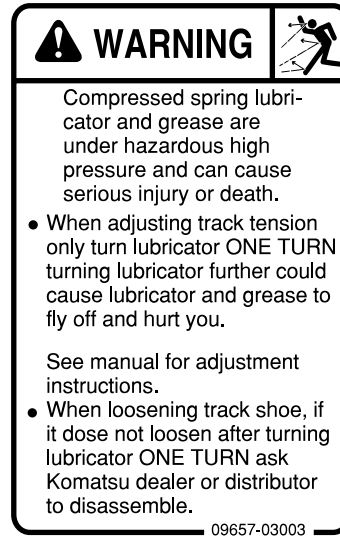


(5) Precautions for high-temperature cooling water (09668-03001)

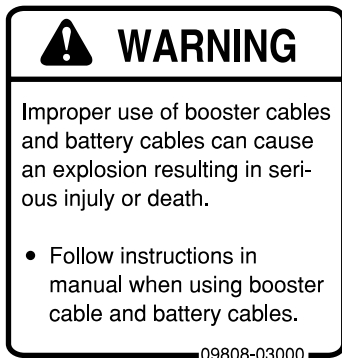


(6) Precautions for check and adjust track tension (09657-03003)

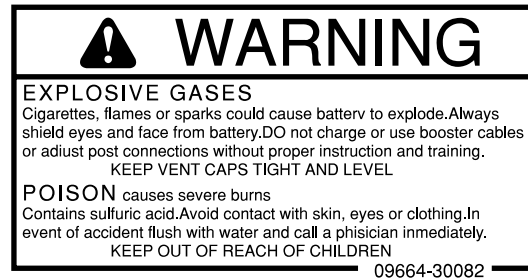
Safety label is attached on the back side of the inspection cover of the track frame.



(7) Precautions for handling electric wires (09808-03000)



(8) Warning for battery (09664-30082)



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



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



GENERAL PRECAUTIONS

SAFETY RULES

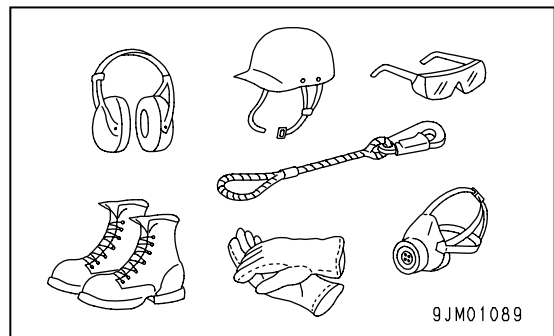
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely 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 ABNORMALITIES ARE FOUND

If you find any abnormality 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 abnormality 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.

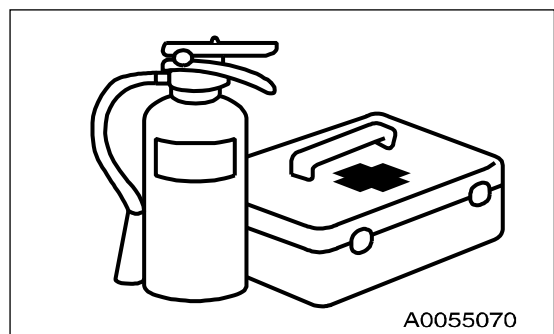


- Check that all protective equipment functions properly before using it.

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.

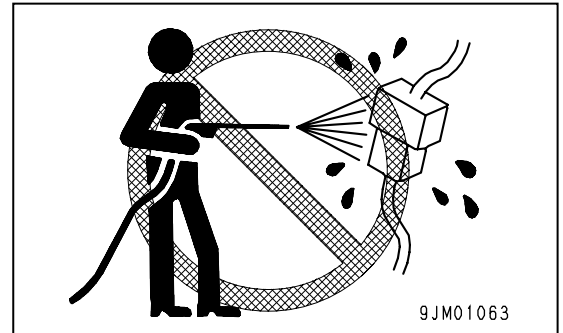


SAFETY FEATURES

- 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.

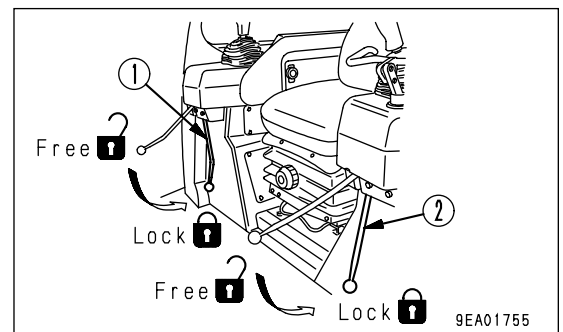


INSIDE OPERATOR'S COMPARTMENT

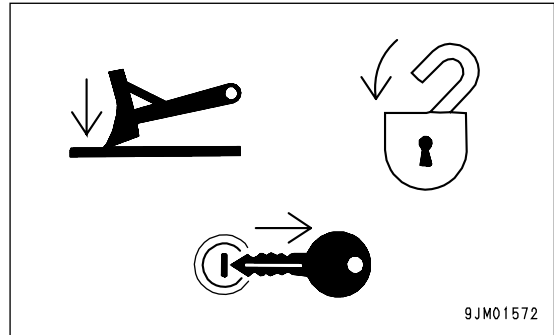
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do 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 cab.

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 safety lock lever(1) and brake lock lever(2) securely to the LOCK position, 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 safety lock lever(1) and brake lock lever(2) securely to the LOCK position, 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.

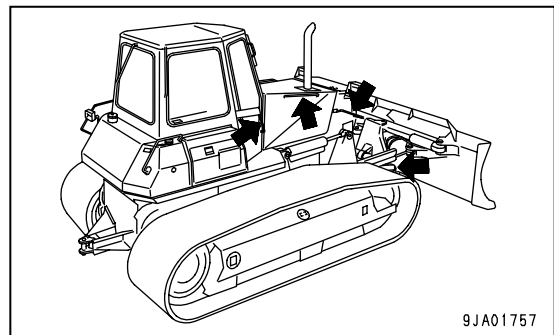
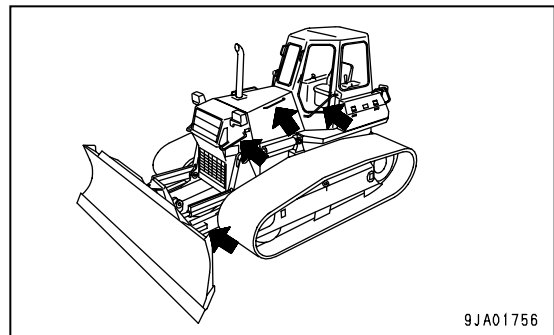


HANDRAILS AND STEPS

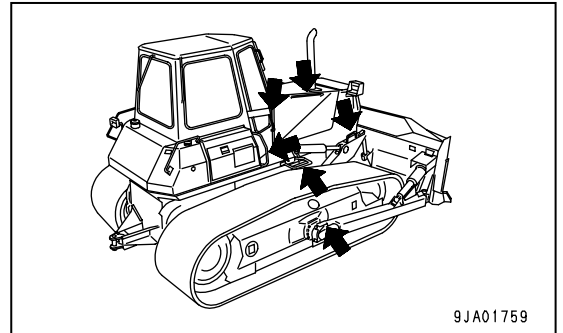
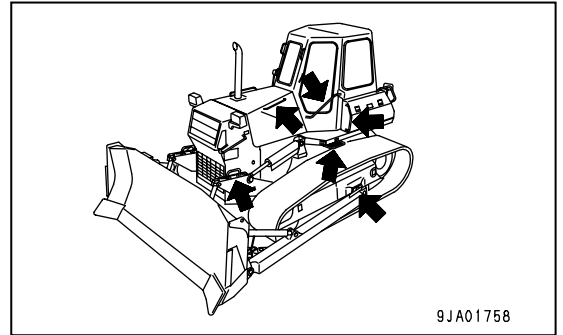
To prevent personal injury caused by slipping or falling off the machine, always do as follows.

- Use the handrails and steps marked by arrows in the diagram on the right when getting on or off the machine.

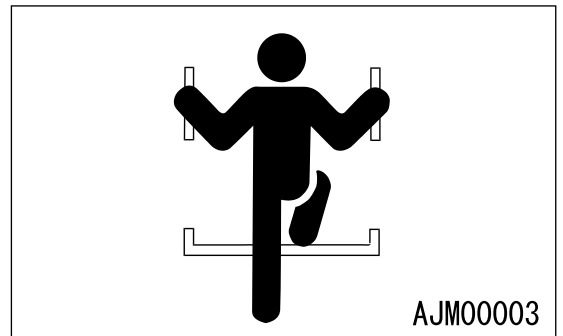
For power angle, power tiltdozer



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 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.

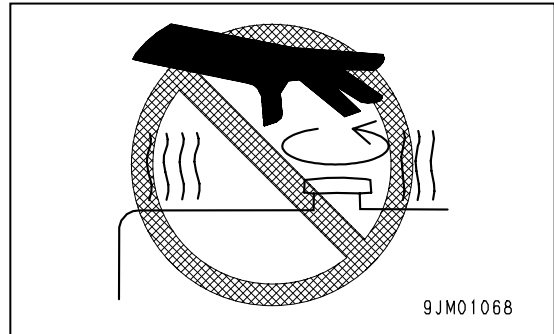
NO PEOPLE ON ATTACHMENTS

Never let anyone ride on the attachments. There is a hazard of falling and suffering serious injury.

PREVENTION OF BURNS

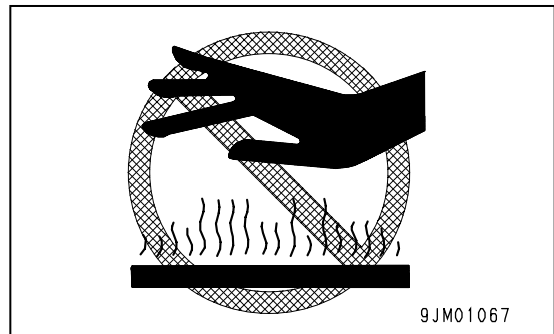
Hot coolant

- 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 or other parts when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the cap by hand before starting the operation. Even when the oil has cooled down, loosen the plug slowly to relieve the internal pressure before removing the plug.

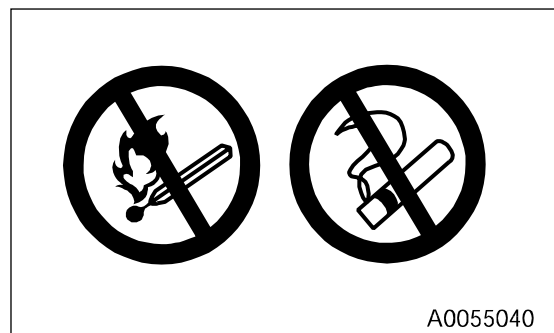
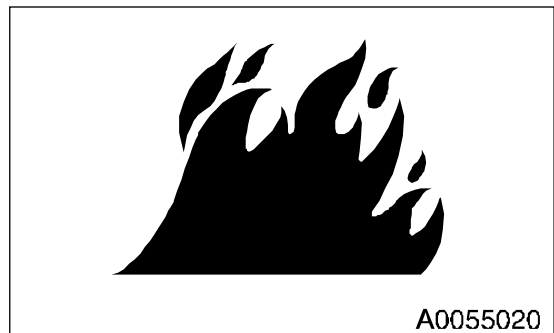


FIRE PREVENTION

● Fire caused by fuel or oil

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, use explosion-proof lighting. If you do not use explosion-proof lighting, there is a hazard of serious injury or damage caused by explosion.
 - When taking the electrical power for the lighting from the machine, follow the instructions in this manual.

ACTION IF FIRE OCCURS

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

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

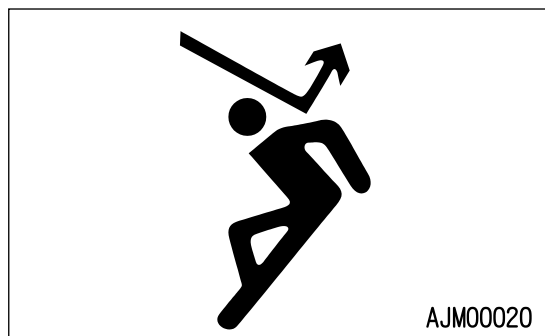
WINDOW WASHER LIQUID

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 (Roll Over Protective Structure)

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 lower. When modifying it, consult your Komatsu distributor.
- If ROPS is deformed by falling objects or by rolling over, its strength lowers and its design functions cannot be maintained. In this case, be sure to ask your Komatsu distributor about repair method.



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- Even if ROPS is installed, it does not work normally, if your seat belt is not fastened. Be sure to fasten your seat belt when operating machine.

PRECAUTIONS FOR ATTACHMENTS

- When installing optional parts or attachments, there may be problems with safety or legal restrictions, so please 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

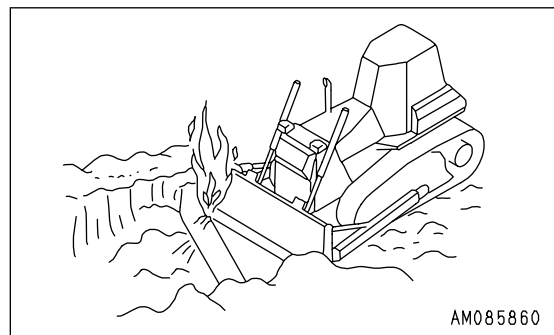
Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

- Komatsu will not be responsible for any injuries, accidents, or product failures 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 necessary measures to prevent any unauthorized person from entering the operating area.
- In particular, if you need to operate on a road, protect pedestrian and cars by designating a person for worksite traffic duty or by installing fences around the worksite.
- 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.
- 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.

	Voltage	Min. safety distance
Low voltage	100V 200V	2m
	6,600V	2m
Very high voltage	22,000V	3m
	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

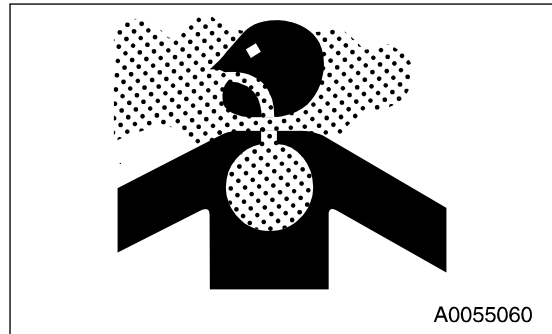
ENSURE GOOD VISIBILITY

- 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 you provide adequate ventilation is provided to prevent gas poisoning.



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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.

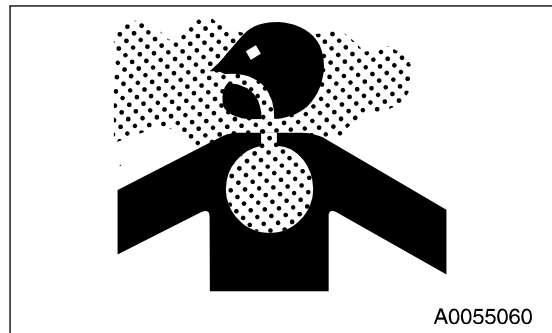
EMERGENCY EXIT FROM OPERATOR'S CAB

There are doors on the left and right sides of machines equipped with a cab. If the door on one side does not open, use the door on the other side as an emergency exit.

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.



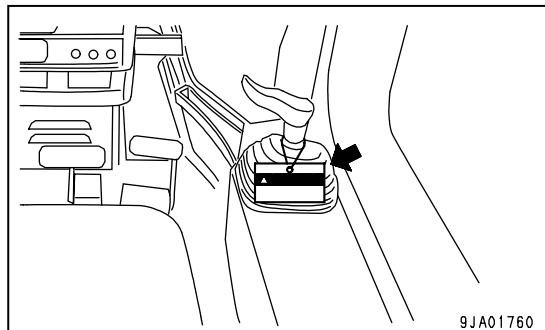
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This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.

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 (1).



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.
- Check that there are no persons or obstacles above, below, or in the area around the machine.

PRECAUTIONS WHEN STARTING

- When starting the engine, sound the horn as a warning.
- Start and operate the machine only while seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Do not short circuit the starting motor circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.

PRECAUTIONS IN COLD AREAS

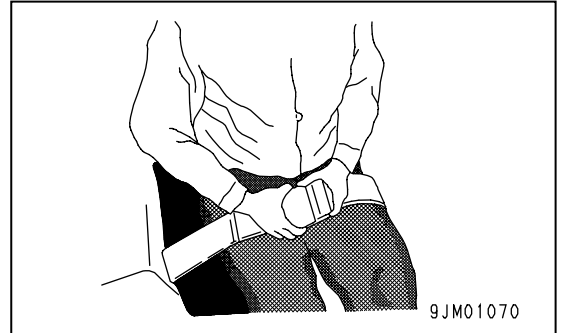
- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery. Before charging or starting the engine with a different power source, melt the battery electrolyte and check for frost and leakage of battery electrolyte before starting.

OPERATION

CHECKS AFTER 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.

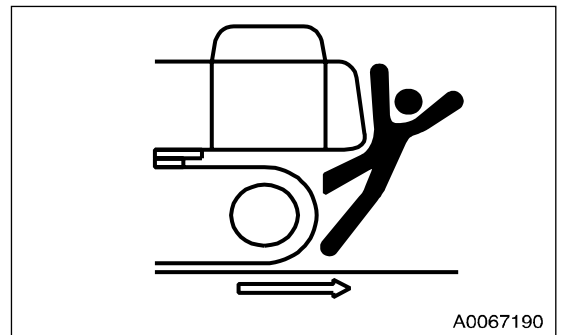
- Always fasten your seat belt.
- Check the actuating condition of the work equipment, travel, and brake systems.
- Check for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any abnormality is found, carry out repairs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



PRECAUTIONS FOR MOVING MACHINE FORWARD OR IN REVERSE

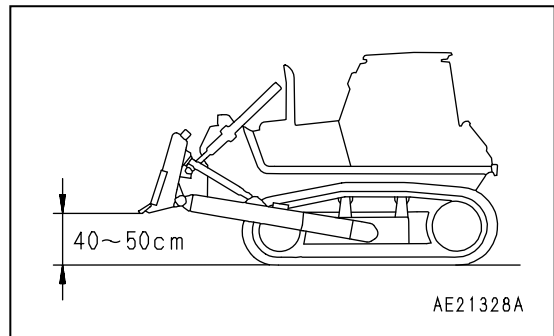
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check 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.

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

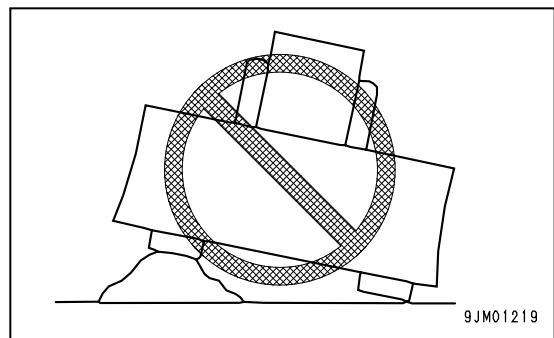


PRECAUTIONS WHEN TRAVELING

- When traveling on flat ground, keep its height at 40 to 50cm (16 to 20in) above 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.

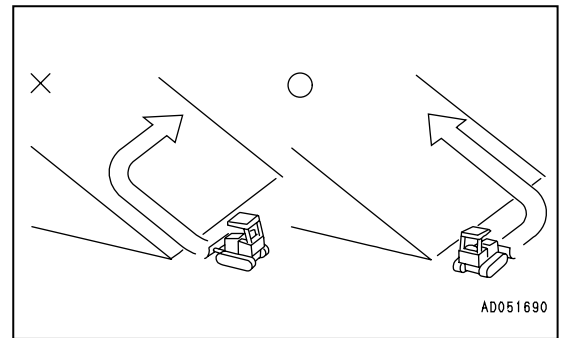


- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.
- Do not approach the edge of a cliff carelessly. When dropping soil over a cliff for banking or reclamation, 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.

- When traveling on slopes, keep the blade approximately 20 to 30cm (8 to 12in) above the ground. In case of emergency, quickly lower the blade to the ground to help the machine to stop. Apply the brake and use the engine as a brake, if necessary.
- 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.
- Do not shift the gear while traveling downhill or travel downhill with the transmission in neutral. If this is neglected, the engine does not work as a brake, and that is dangerous. Be sure to set the transmission in one of the lower gear speeds. In addition, apply the brake and use the engine as a brake, if necessary.
- When turning on a downhill ground, lower the travel speed.
- On a slope where the machine travels down by itself, take care of countersteering.

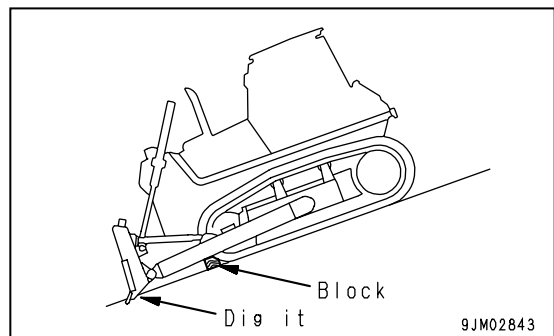
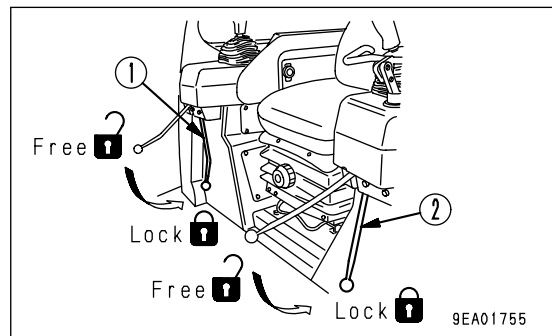
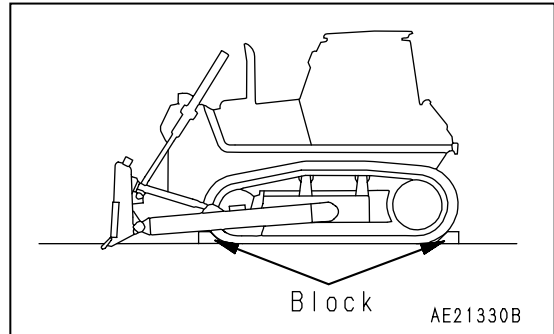
OPERATE CAREFULLY ON SNOW

- 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 applying 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, directional and gear shift levers in the N(Neutral) position and set the blade lever in the holding position, then apply safety lock lever(1) and brake lock lever(2) and 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.

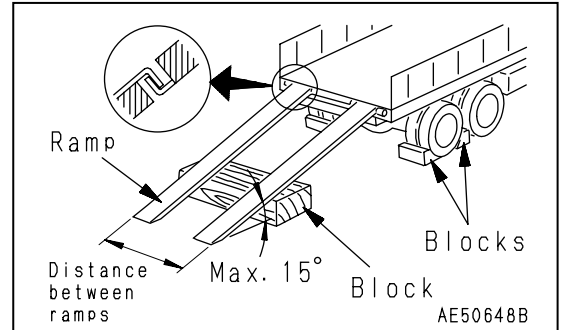


TRANSPORTATION

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.

- 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, take extremely careful since the ramp surface is slippery.
- Run the engine at low idling, set to low speed, and operate the machine slowly when loading or unloading.
- When on the ramps, do not operate any lever except for the travel lever.
- 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 loading the machine. If this is not done, the door may suddenly open during transportation.



SHIPPING

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

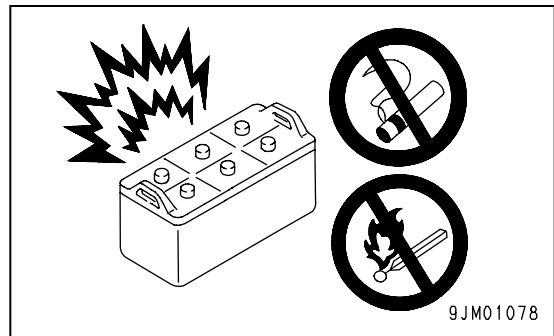
- Investigate all state and local laws governing the weight, width, and length of a load. If necessary, disassemble the work equipment. The width, height and weight of the load differ according to the work equipment, so take this into account when determining the shipping route.
- When passing over bridges 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 (PAGE 3-88)" in the OPERATION section.

BATTERY

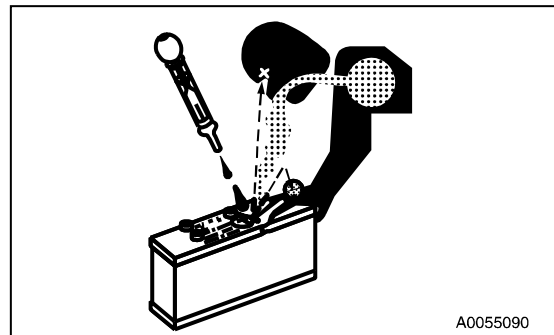
BATTERY HAZARD PREVENTION

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. Always 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 amounts of water.
- If acid gets into your eyes, flush them immediately with large quantities of water and seek medical attention.



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

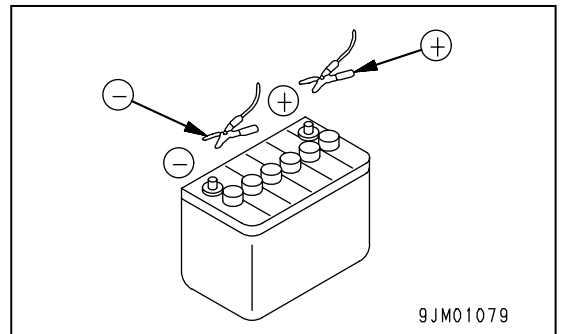
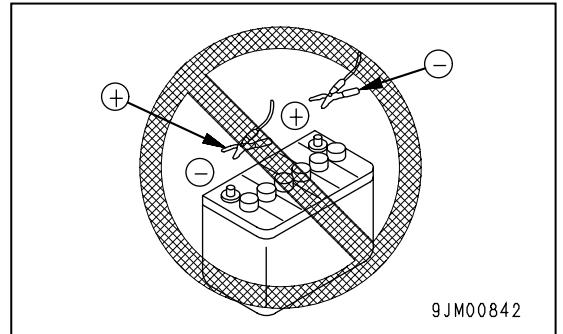
As there is a hazard that sparks will be generated, always do as follows.

- 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 ground or 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 (PAGE 3-105)" in the OPERATION section.



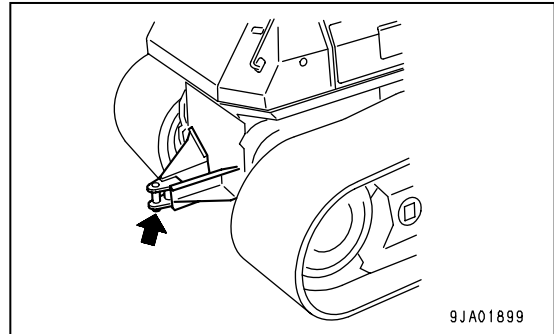
TOWING

WHEN TOWING

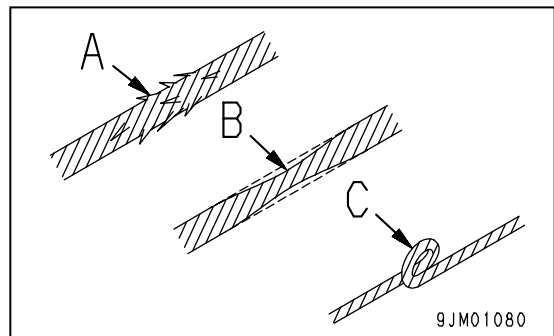
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing method, see the section of "TOWING THE MACHINE (PAGE 3-102)".

- 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.

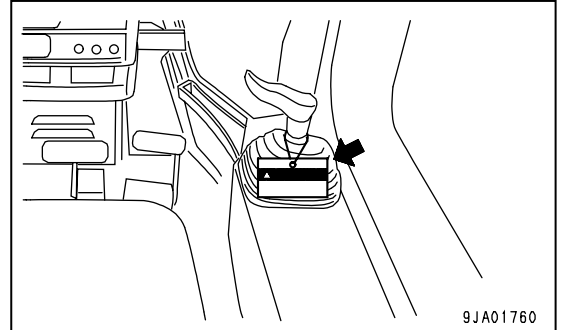


- If the engine stops or the oil pressure in the brake circuit lowers because of a trouble in the hydraulic system, the brake works and the machine cannot move. To move the machine in this case, the oil pressure in the brake circuit must be heightened to the specified level with a special device. Ask your Komatsu distributor.

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 not the tool box, 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 and tidy to enable you to carry out operations safely. If the work place is not kept clean and tidy, there is the danger that you will trip, slip, or fall over and injure yourself.

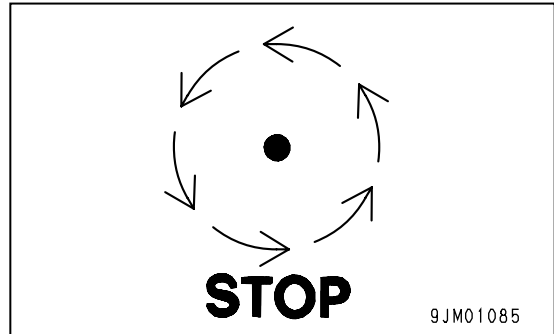
APPOINT LEADER WHEN WORKING WITH OTHERS

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

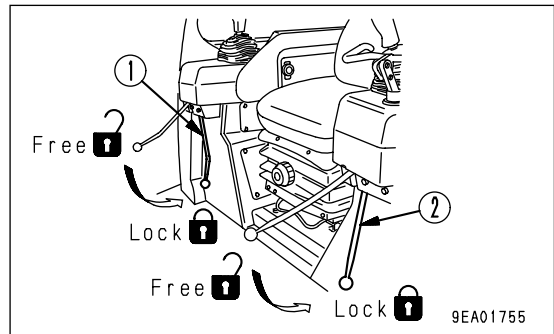
When working with others, misunderstandings between workers can lead to serious accidents.

STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

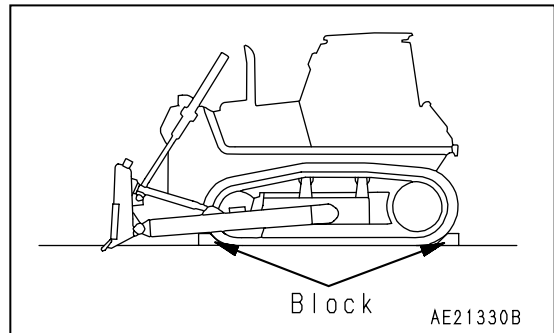
- Stop the machine on firm, level ground.
- Select a place where there is no danger of falling rocks, landslides, or flooding.
- Lower the work equipment completely to the ground and stop the engine.



- Set safety lock lever (1) and brake lock lever (2) to the LOCK position.



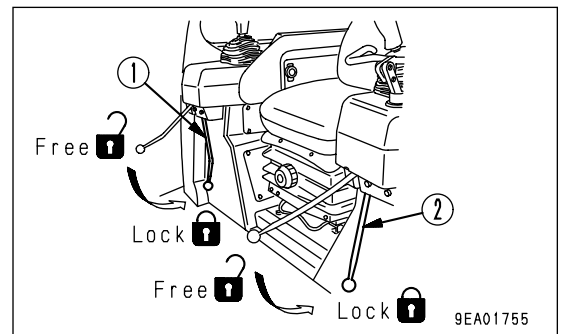
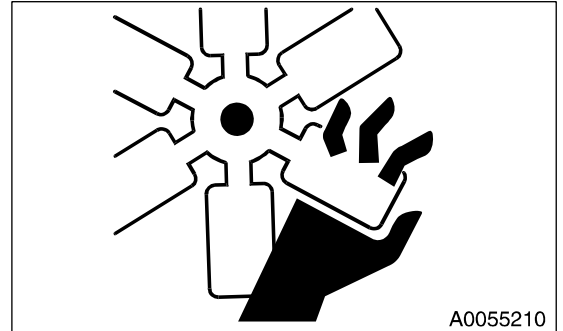
- Put blocks under the track to prevent the machine from moving.



TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

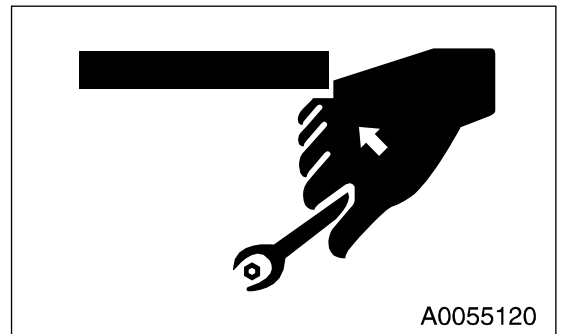
To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- 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.
- set safety lock lever (1) and brake lock lever (2) to the LOCK position.
- 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 extremely careful.
- Do not touch any control levers. If any control lever must be operated, always give a signal to the other workers to warn them to move to a safe place.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.



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.



PERSONNEL

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.



PRECAUTIONS FOR WORK UNDER MACHINE AND WORK EQUIPMENT

- 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 off the ground and the machine is supported only by the work equipment. If the control levers are touched by mistake, or there is a hazard to the hydraulic line, the work equipment or the machine may suddenly descend. This is extremely dangerous. Never work under the machine if the machine is not properly supported by blocks or stands.



NOISE

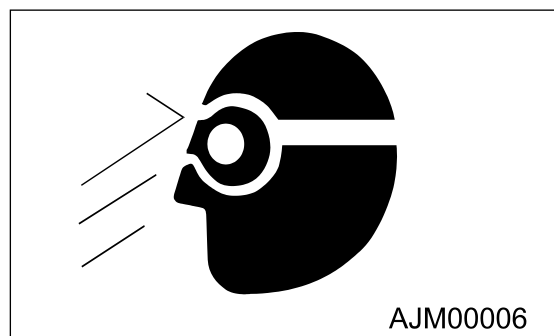
If the noise from the machine is too loud, it may cause temporary or permanent hearing problems.

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, 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, 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.
- If pins are hit with strong force, there is a hazard that the pin may fly out and injure people in the surrounding area.



REPAIR WELDING

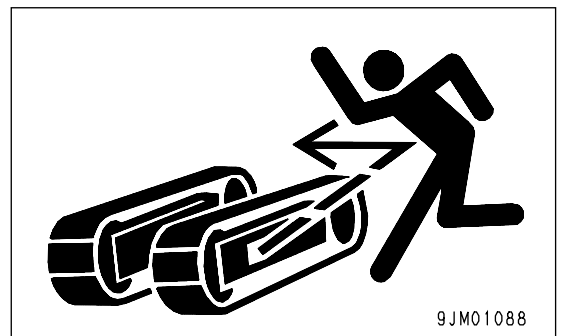
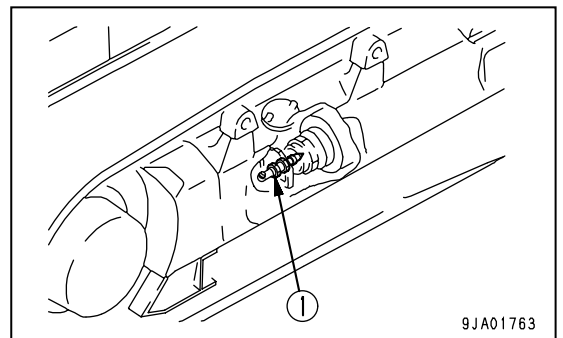
Welding operations must always be carried out by a qualified welder and in a place equipped with a proper equipment. There is a hazard of fire or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

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

The recoil spring assembly is used to reduce the impact on the idler. It contains a spring under high pressure, so if it is disassembled by mistake, the spring will fly out and cause serious injury or even death. Never disassemble the recoil spring.

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 or property damage, so always do as follows.

- For the releasing procedure of the internal pressure, see "PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM (PAGE 4-39)". Do not inspect or replace any part while the internal pressure is applied.
- 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 or property damage. 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.

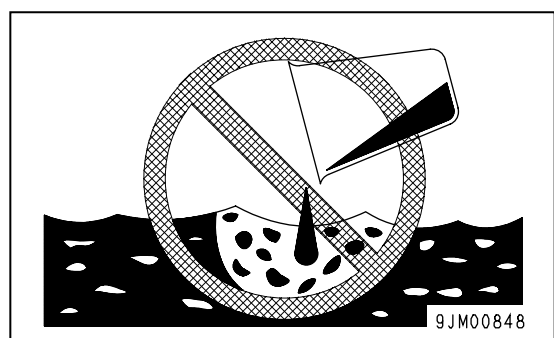
Replace the hose if any of the following problems are found.

- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement layer of wire.
- 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 frost-bite. Never touch refrigerant.

COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury or property damage 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 safely 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 (PAGE 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 property damage. 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.

MEMO

OPERATION

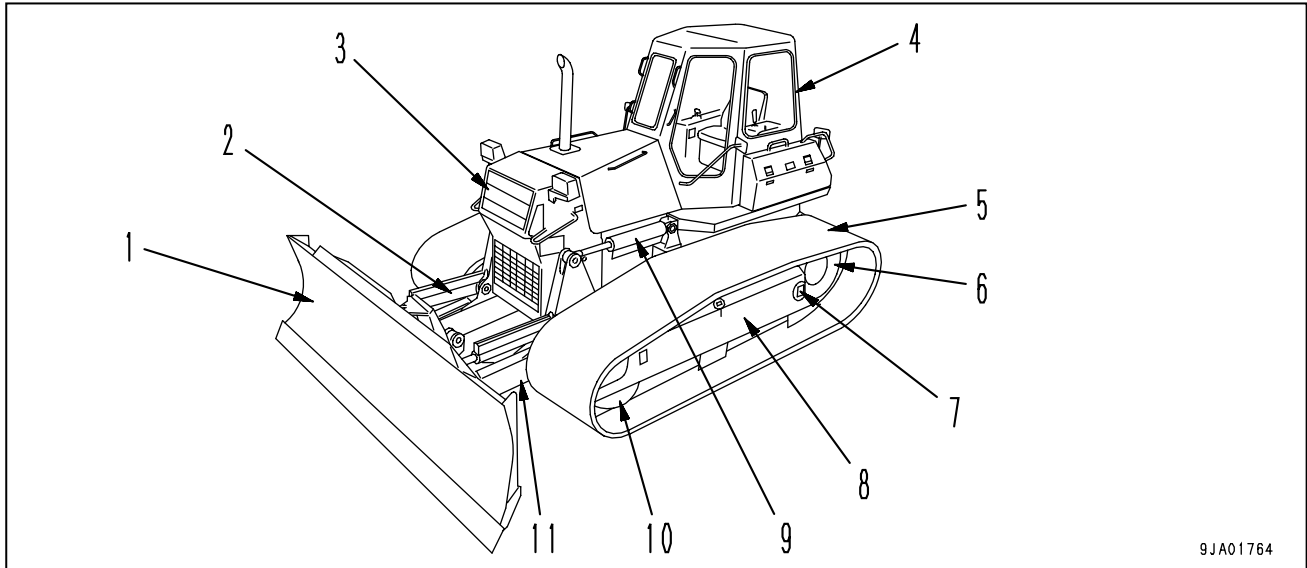
 **WARNING**

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

GENERAL VIEW

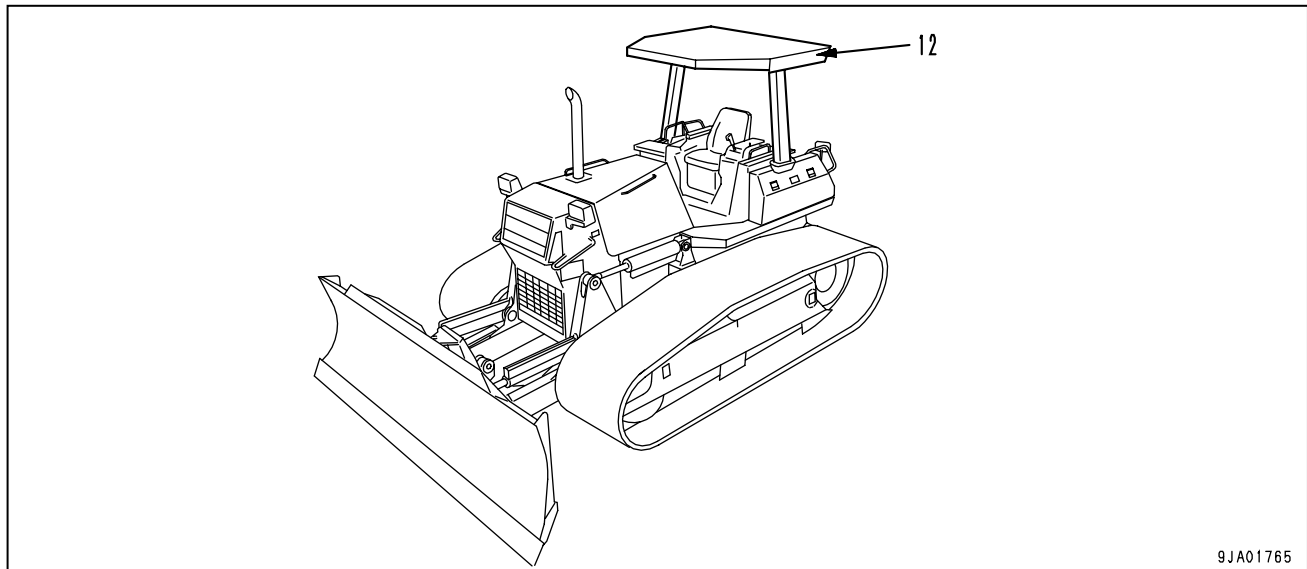
GENERAL VIEW OF MACHINE

Machine equipped with cab



9JA01764

Machine equipped with canopy

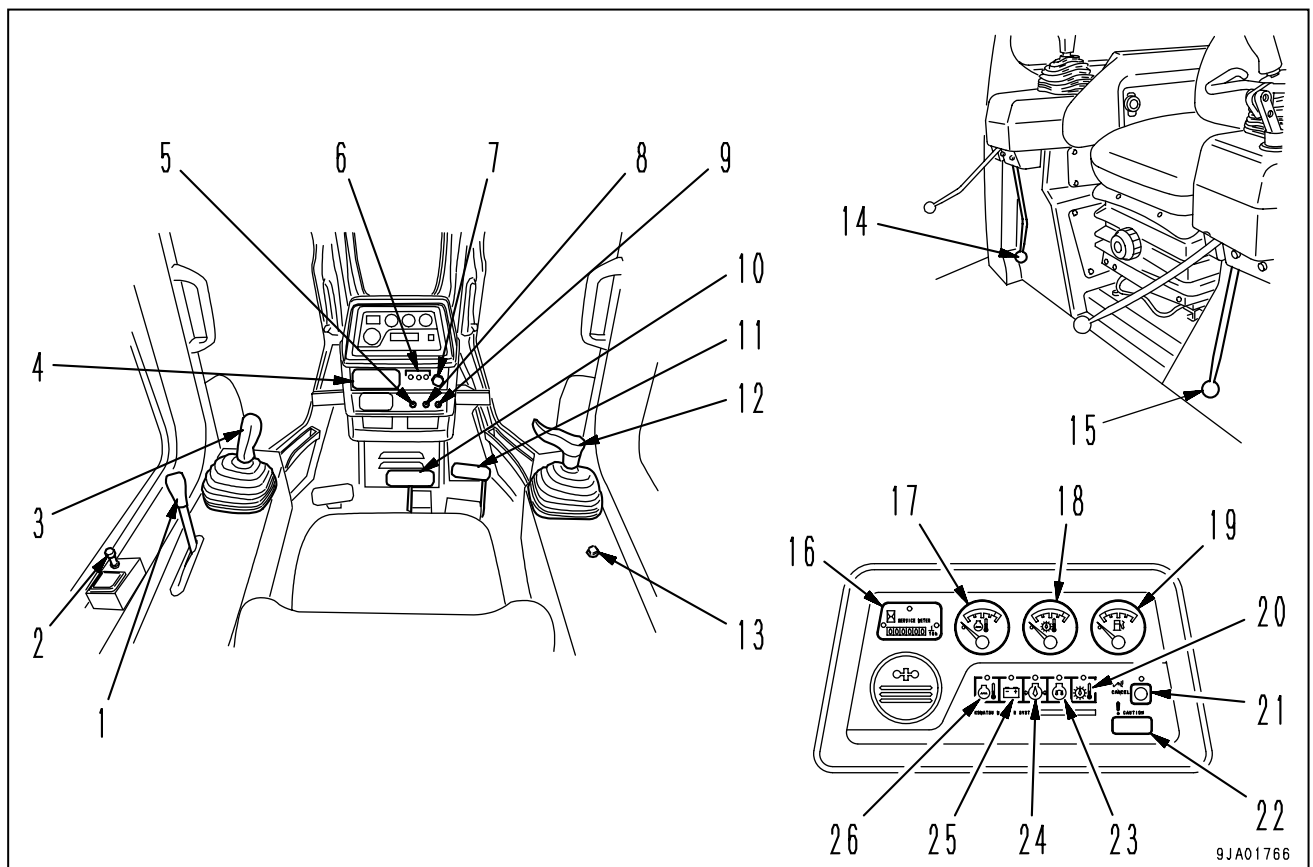


9JA01765

- | | |
|--------------------|-------------------|
| (1) Blade | (7) Pivot shaft |
| (2) Angle cylinder | (8) Track frame |
| (3) Radiator mask | (9) Lift cylinder |
| (4) Cab | (10) Idler |
| (5) Track shoe | (11) Frame |
| (6) Sprocket | (12) Canopy |

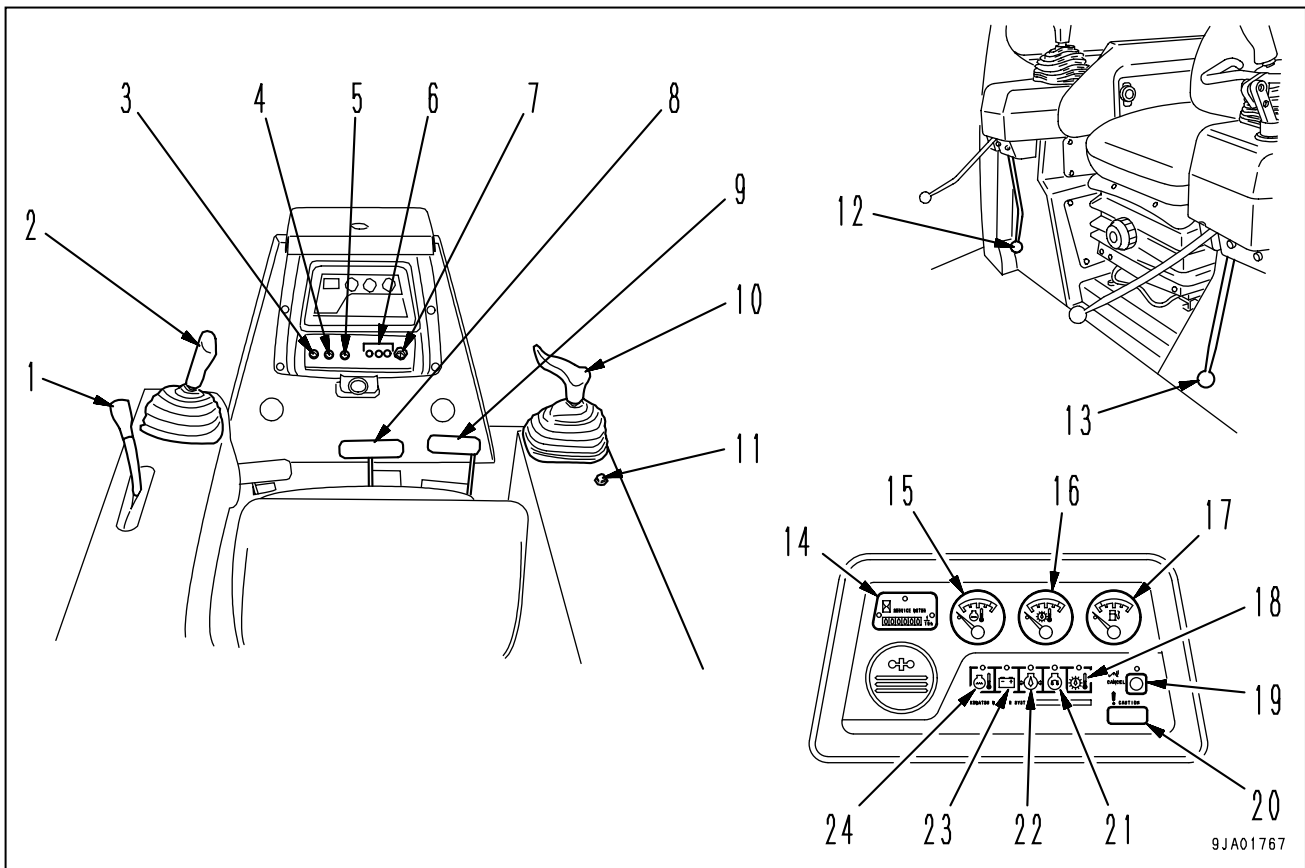
GENERAL VIEW OF CONTROLS AND GAUGES

Machine equipped with cab



- | | |
|------------------------------------------------|--------------------------------------------------|
| (1) Fuel control lever | (14) Safety lock lever (for blade control lever) |
| (2) Cigarette lighter | (15) Brake lock lever |
| (3) Steering, directional and gear shift lever | (16) Service meter |
| (4) Air conditioner panel or heater panel | (17) Engine water temperature gauge |
| (5) Head lamp switch | (18) Transmission oil temperature gauge |
| (6) Speed range display lamp | (19) Fuel gauge |
| (7) Starting switch | (20) Transmission oil temperature caution lamp |
| (8) Rear lamp switch | (21) Monitor caution cancel switch |
| (9) Glow switch | (22) Monitor caution lamp |
| (10) Brake pedal | (23) Glow signal lamp |
| (11) Decelerator pedal | (24) Engine oil pressure caution lamp |
| (12) Blade control lever | (25) Charge lamp |
| (13) Horn switch | (26) Engine water temperature caution lamp |

Machine equipped with canopy



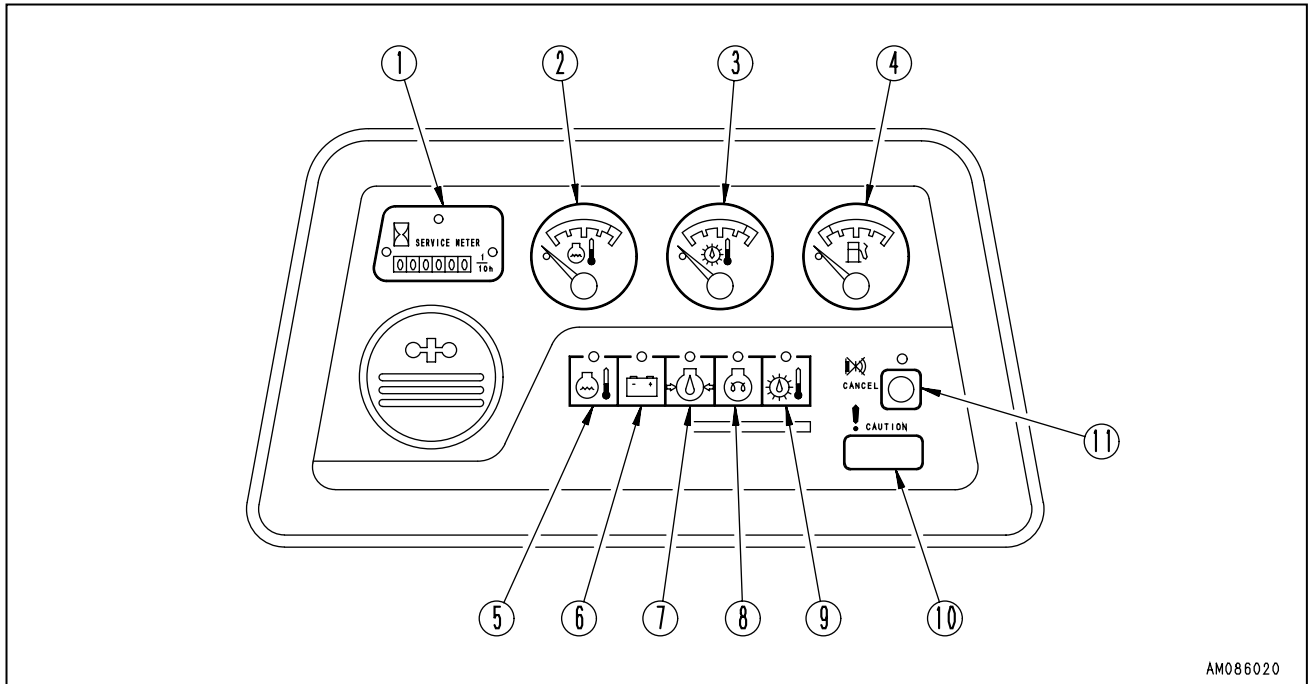
- | | |
|--------------------------------------------------|------------------------------------------------|
| (1) Fuel control lever | (13) Brake lock lever |
| (2) Steering, directional and gear shift lever | (14) Service meter |
| (3) Head lamp switch | (15) Engine water temperature gauge |
| (4) Rear lamp switch | (16) Transmission oil temperature gauge |
| (5) Glow switch | (17) Fuel gauge |
| (6) Speed range display lamp | (18) Transmission oil temperature caution lamp |
| (7) Starting switch | (19) Monitor caution cancel switch |
| (8) Brake pedal | (20) Monitor caution lamp |
| (9) Decelerator pedal | (21) Glow signal lamp |
| (10) Blade control lever | (22) Engine oil pressure caution lamp |
| (11) Horn switch | (23) Charge lamp |
| (12) Safety lock lever (for blade control lever) | (24) Engine water temperature caution lamp |

EXPLANATION OF COMPONENTS

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

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

MONITOR PANEL



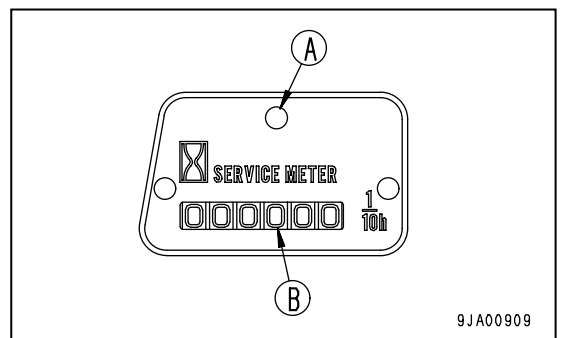
AM086020

- (1) Service meter
- (2) Engine water temperature gauge
- (3) Transmission oil temperature gauge
- (4) Fuel gauge
- (5) Engine water temperature caution lamp
- (6) Charge lamp
- (7) Engine oil pressure caution lamp
- (8) Glow signal lamp
- (9) Transmission oil temperature caution lamp
- (10) Monitor caution lamp
- (11) Monitor caution cancel switch

SERVICE METER

This meter(1) shows the total operation hours of the machine. Set the periodic maintenance intervals using this display. The service meter advances while the engine is running, even if the machine is not traveling.

While the engine is running, the pilot lamp (A) at the top of the meters keeps flashing to indicate that the meter is advancing. Meter (B) will advance by 1 for each hour of operation regardless of the engine speed.



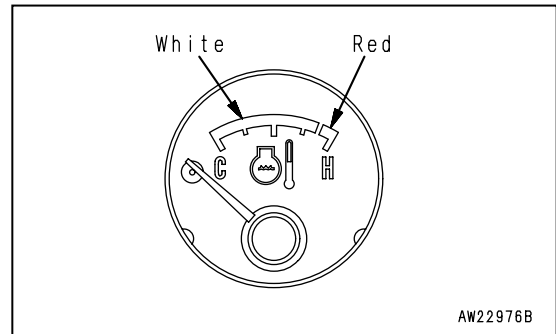
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ENGINE WATER TEMPEARTURE GAUGE

This gauge(2) indicates the cooling water temperature.

When the indicator is in the white range during operation, the water temperature is normal.

If the indicator moves from the white range into the red range during operation, stop the machine immediately, run the engine under no load at a midrange speed, and wait for the indicator to go down to the white range. After starting the engine, warm up it until the indicator moves into the white range.

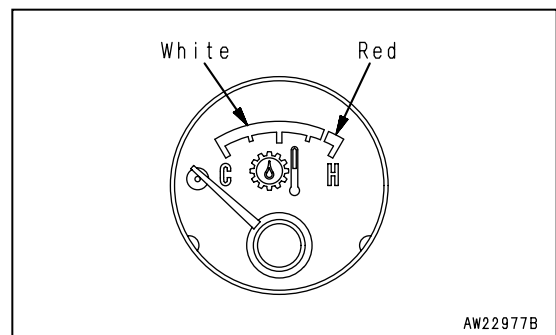


TRANSMISSION OIL TEMPERATURE GAUGE

This meter(3) indicates the temperature of the transmission lubricating oil.

When the indicator is in the white range during operation, the oil temperature is normal.

If the indicator moves from the white range into the red range during operation, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator to go down to the white range.



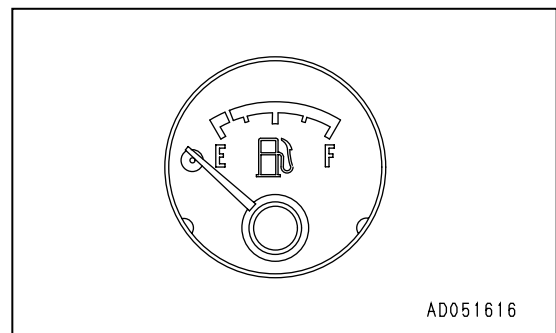
FUEL GAUGE

When the starting switch is turned ON, this meter(4) displays the amount of fuel remaining in the fuel tank.

F indicates a full tank.

When the indicator points to E, it indicates that there is less than 43 liters (11.35US gal) remaining, so add fuel.

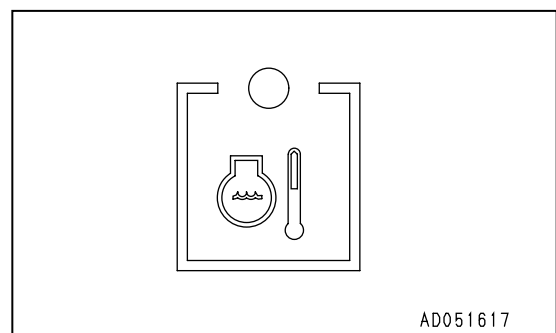
Always fill the tank after finishing operations.



ENGINE WATER TEMPERATURE CAUTION LAMP

This lamp(5) warns of a rise in the temperature of the engine cooling water.

If the lamp lights up, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator of the engine water temperature gauge to go down to the white range.

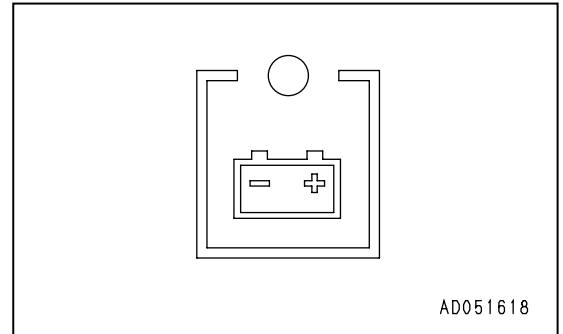


CHARGE LAMP

This lamp(6) indicates malfunction of the alternator.

When the starting switch is turned ON, it will light up, but it should go out when the engine speed rises.

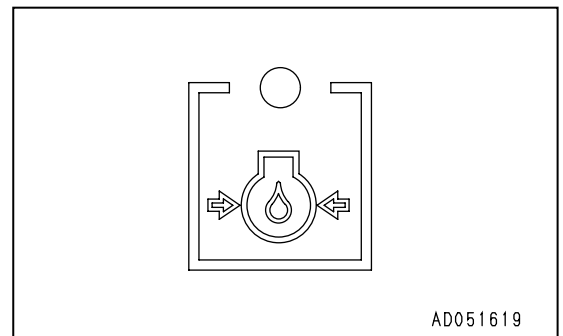
If the lamp lights up during operation, stop the engine and check the V-belt tension. If any abnormality is found, see "OTHER TROUBLE (PAGE 3-107)".



ENGINE OIL PRESSURE CAUTION LAMP

This lamp(7) warns that the engine lubricating oil pressure has dropped. When the starting switch is turned ON, it will light up. When the lamp goes off after the engine is started, the oil pressure is normal.

When the lamp lights up during operation, the oil pressure is lower. Immediately stop the engine and look for the cause. For details, see "OTHER TROUBLE (PAGE 3-107)".

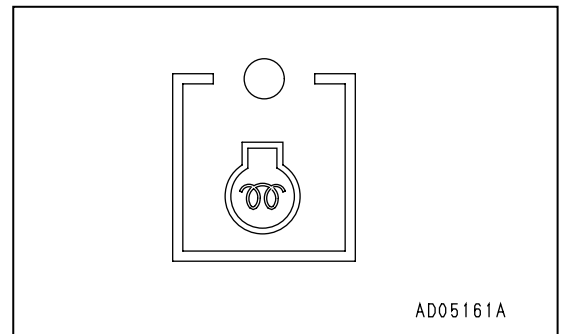


GLOW SIGNAL LAMP

This lamp(8) indicates the electrical intake air heater is re-heated. While preheating is being carried out with the glow switch, the lamp lights up.

In the case of automatic preheating, the lamp goes out when the preheating is completed.

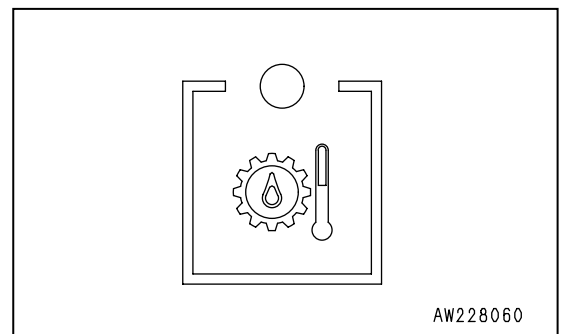
In the case of manual preheating, the lamp goes out when the glow switch is released.



TRANSMISSION OIL TEMPERATURE CAUTION LAMP

This lamp(9) warns the operator that the oil temperature at the transmission outlet port has risen.

If the lamp lights up, stop the machine, run the engine under no load at a midrange speed, and wait for the transmission oil temperature gauge to go down to the white range.

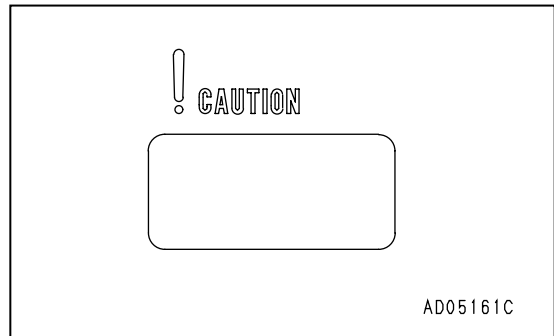


MONITOR CAUTION LAMP

This lamp(10) lights up when any of the following caution lamps lights up.

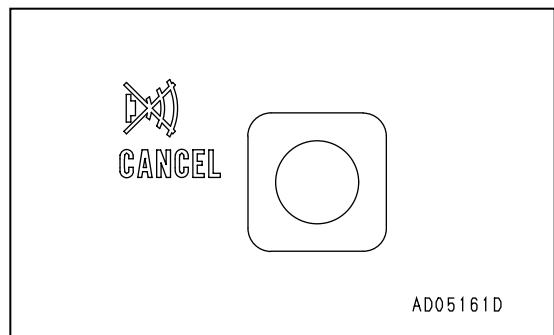
In addition, the alarm buzzer sounds at the same time.

- Engine water temperature caution lamp
- Charge lamp
- Engine oil pressure caution lamp
- Transmission oil temperature caution lamp



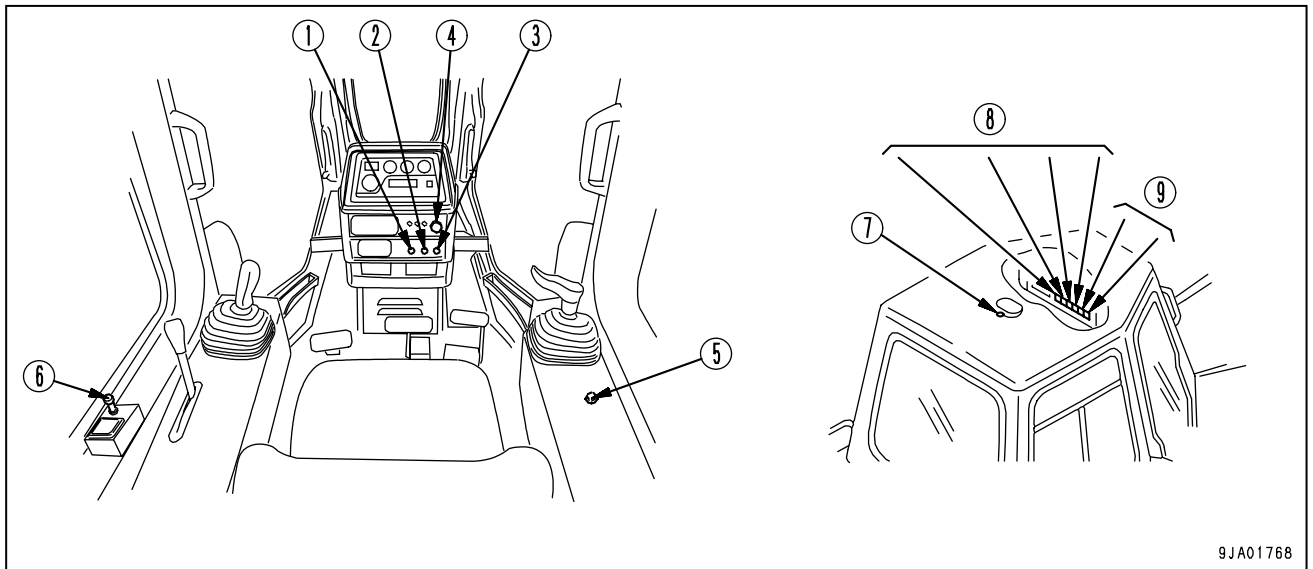
MONITOR CAUTION CANCEL SWITCH

This switch(11) is used to cancel monitor caution lamp. Press the switch to turn the monitor caution lamp out and to stop the alarm buzzer.

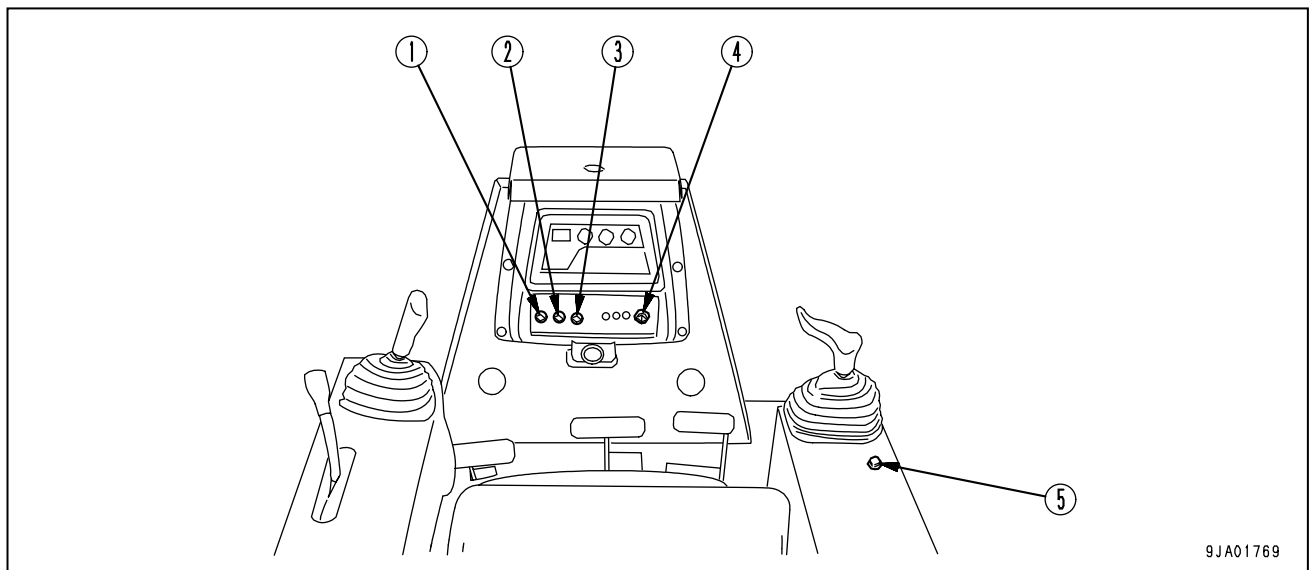


SWITCHES

Machine equipped with cab



Machine equipped with canopy



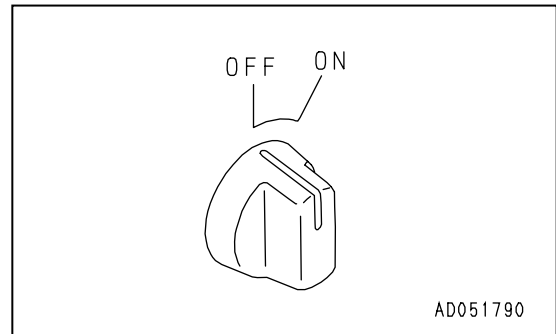
- | | |
|----------------------|---------------------------------------------------|
| (1) Head lamp switch | (6) Cigarette lighter (machine equipped with cab) |
| (2) Rear lamp switch | (7) Room lamp (machine equipped with cab) |
| (3) Glow switch | (8) Wiper switch (machine equipped with cab) |
| (4) Starting switch | (9) Additional working lamp switch |
| (5) Horn switch | (machine equipped with cab) (if equipped) |

HEAD LAMP SWITCH

This switch(1) lights up the head lamps.

OFF position: Lamps are out

ON position: Lamps light up

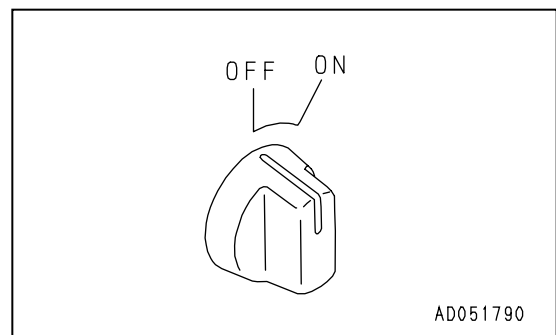


REAR LAMP SWITCH

This switch(2) lights up the rear lamps.

OFF position: Lamps are out

ON position: Lamps light up



GLOW SWITCH

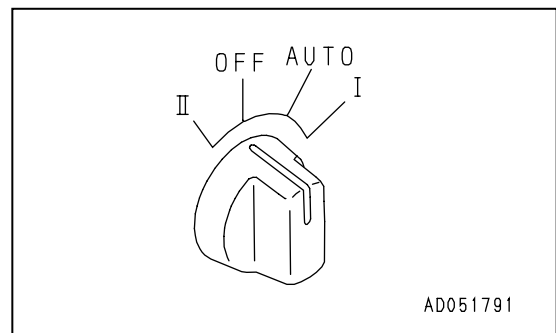
This switch(3) actuates the electrical heater to warm up the engine intake air.

OFF position: The preheating is not actuated.

AUTO position: AUTO preheating is actuated. The length of the preheating time varies according to the ambient temperature when the ambient temperature is below approx. -5°C .

I position: This is used when AUTO preheating is not enough to start the engine in cold weather simply with the glows witch at the AUTO position. When the switch is released, it will return to the AUTO position.

II position: This is used when carrying out preheating manually without using AUTO preheating. When the switch is released, it will return to the OFF position.



STARTING SWITCH

This switch(4) is used to start the engine.

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.

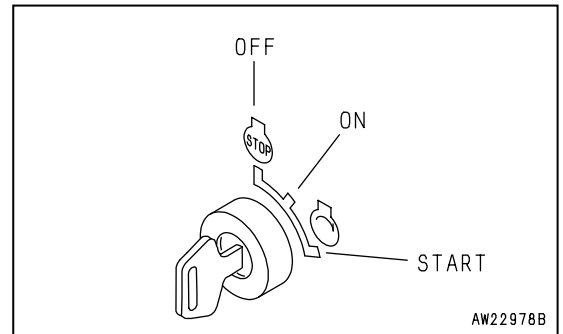
ON position:

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.

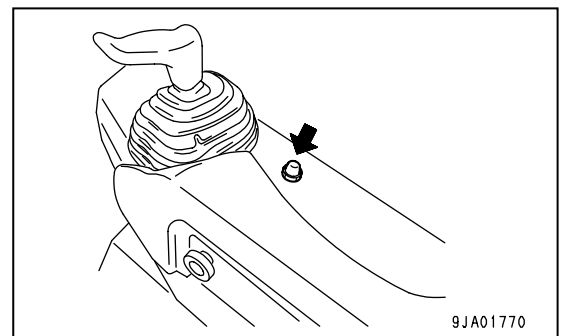
START position:

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



HORN SWITCH

The horn sounds when the button(5) at the rear of the blade control lever at the right side of the operator's seat is pressed.



CIGARETTE LIGHTER

(Machine equipped with cab)

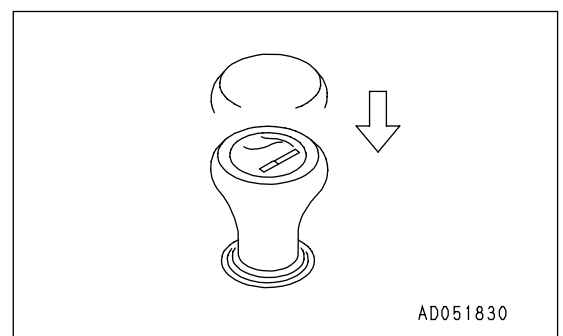
This lighter(6) is used to light cigarettes.

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 12 V equipment. If it is used so, the equipment may be broken.

The capacity of the cigarette lighter is 120W (24V x 5A).



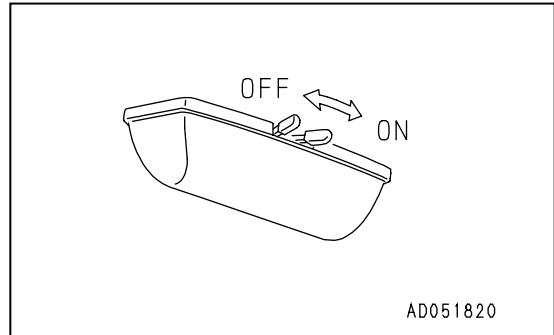
ROOM LAMP SWITCH

(Machine equipped with cab)

This lamp is used to turn on and off room lamp(7).

ON position: Lamp lights up

OFF position: Lamp is out



WIPER SWITCH

(Machine equipped with cab)

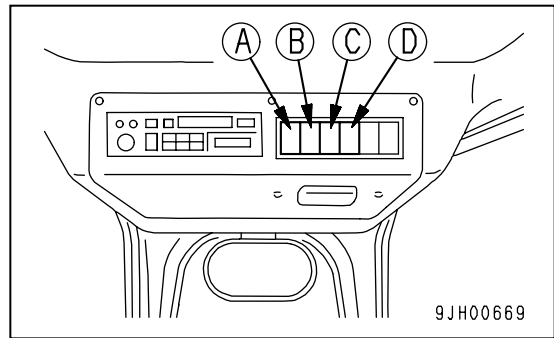
This switch(8) activates the wipers.

The wiper switches are as follows.

- (A)Left door
- (B)Front window
- (C)Right door
- (D)Rear window

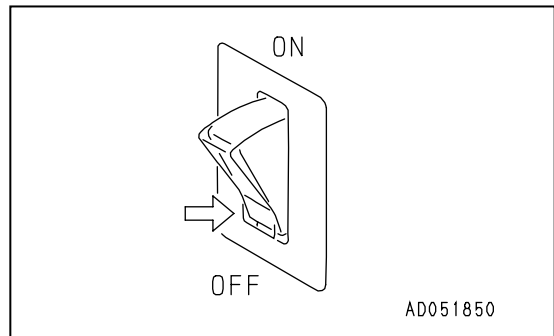
This is also used as the window washer switch.

The switch is operated as follows.



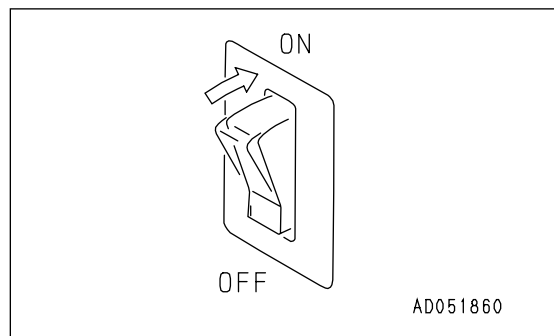
- Window washer only

Keep the switch pressed to the OFF position to spray out water.



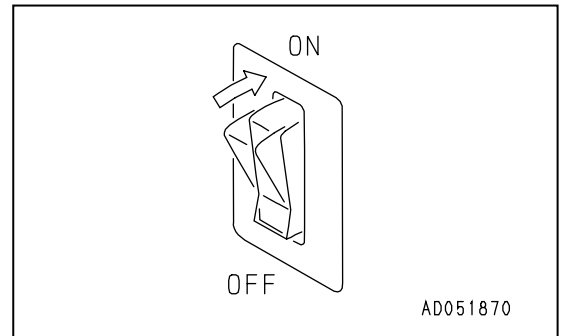
- Wiper only

If this is switched on, the wiper will start.



- Wiper and window washer

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



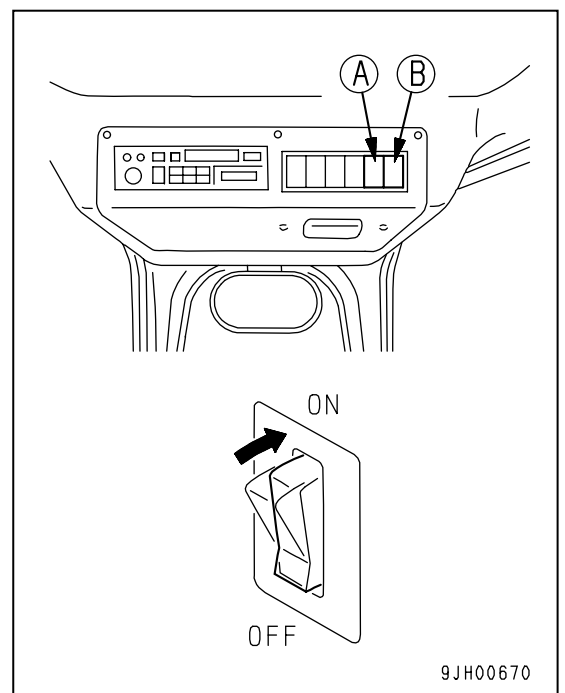
ADDITIONAL WORK LAMP SWITCH

(Machine equipped with cab) (If equipped)

This switch(9) is used to turn on the additional working lamp.

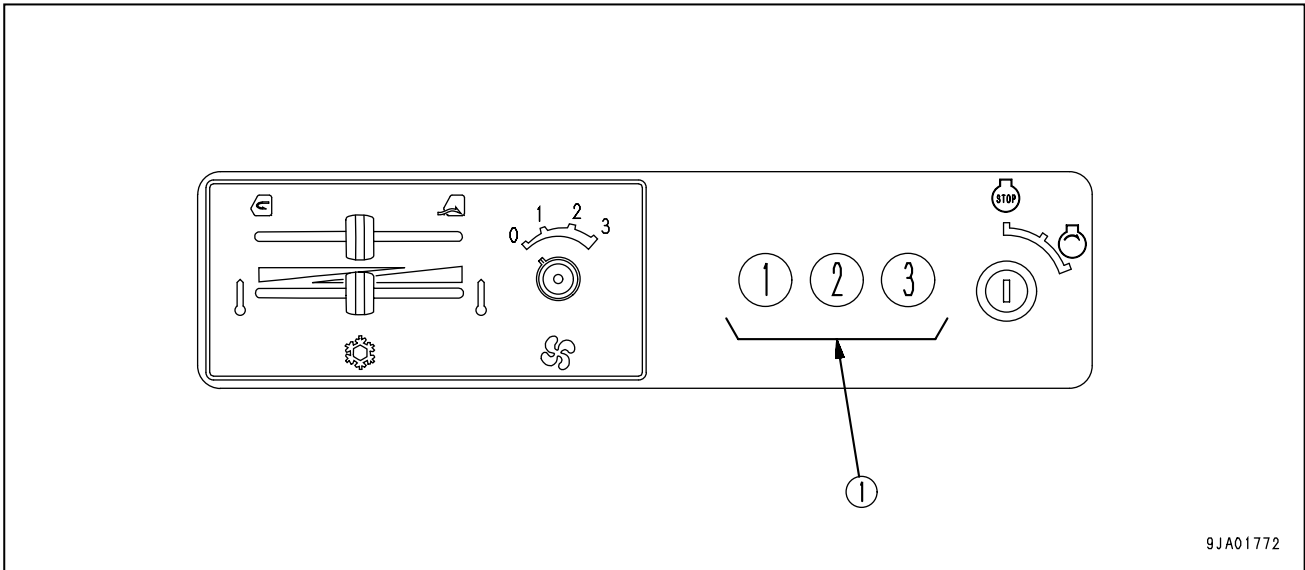
- (A)Head lamp switch
- (B)Rear lamp switch

Push in the direction of the arrow to turn on the lamps.



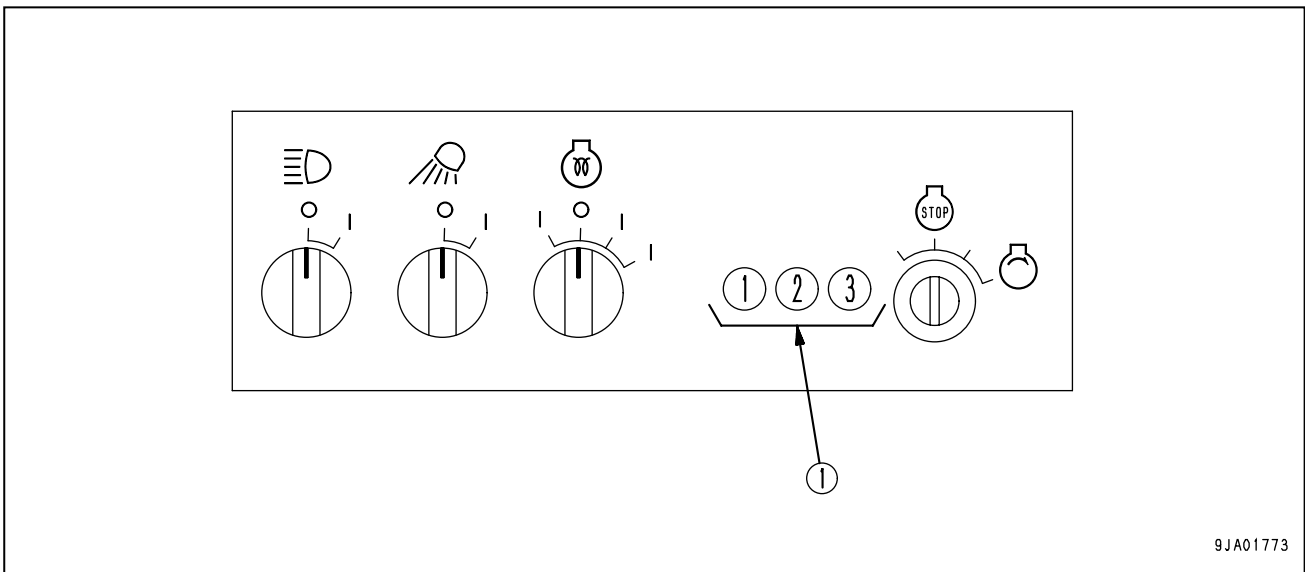
LAMP

Machine equipped with cab. Following illustration shows machine equipped with air conditioner.



9JA01772

Machine equipped with canopy



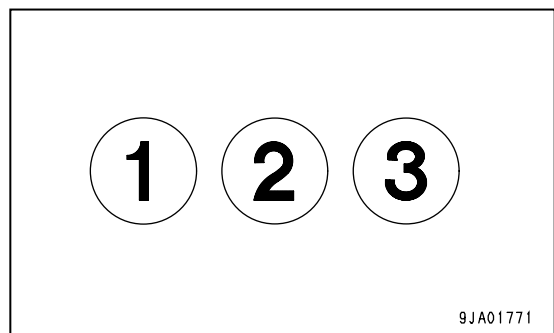
9JA01773

(1)Speed range display lamp

SPEED RANGE DISPLAY LAMP

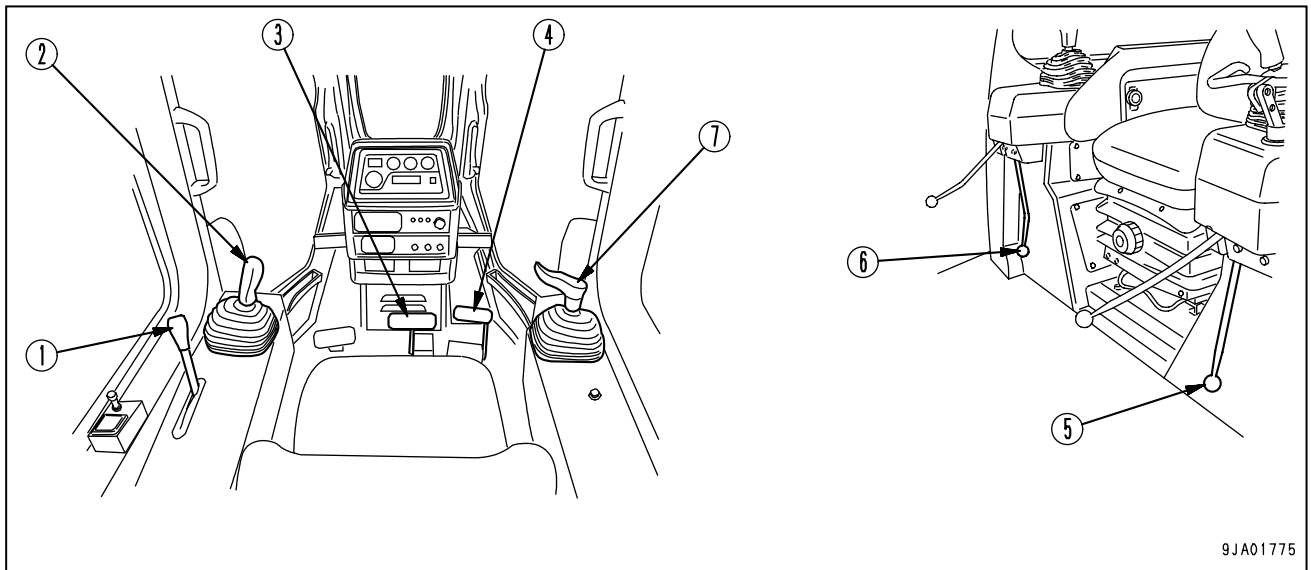
This lamp(1) indicates the currently selected gear speed range.

- When lamp 1 lights up: 1st
- When lamp 2 lights up: 2nd
- When lamp 3 lights up: 3rd



9JA01771

CONTROL LEVERS AND PEDALS

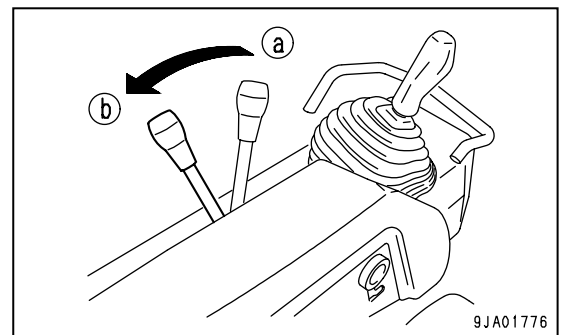


- | | |
|------------------------------------------------|-------------------------------------------------|
| (1) Fuel control lever | (5) Brake lock lever |
| (2) Steering, directional and gear shift lever | (6) Safety lock lever (for blade control lever) |
| (3) Brake pedal | (7) Blade control lever |
| (4) Decelerator pedal | |

FUEL CONTROL LEVER

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

- (a) Low idling position: Push the lever forward fully.
 (b) High idling position: Pull the lever fully



STEERING, DIRECTIONAL AND GEAR SHIFT LEVER

This lever(2) is used to select the direction of travel, to carry out steering, and to carry out counterrotation turns.

- Forward-reverse shifting

Position (a): FORWARD

Position (b): REVERSE

Position N: NEUTRAL

- Steering

Position (c): LEFT TURN

Position (d): RIGHT TURN

Position (e): LEFT COUNTER-ROTATION

Position (f): RIGHT COUNTER-ROTATION

Move the lever to the FRONT to travel FORWARD

Move the lever to the REAR to travel in REVERSE

If the lever is set in the forward or reverse travel position and turned to the right or left, the machine turns to the right or left smoothly according to the stroke of the lever.

If the lever is fully turned to the right or left, the turning radius is shortened.

If the lever is set in the N(Neutral) and turned to the right or left, the machine turns to the right or left by counter-rotation.

REMARK

- If the lever is released when steering the machine, the lever will return to the (a) position or the (b) position and the machine will be returned to straight movement.
- If you support the lever guide with your hand when steering, the turning operation will be easier.

- Gear shifting

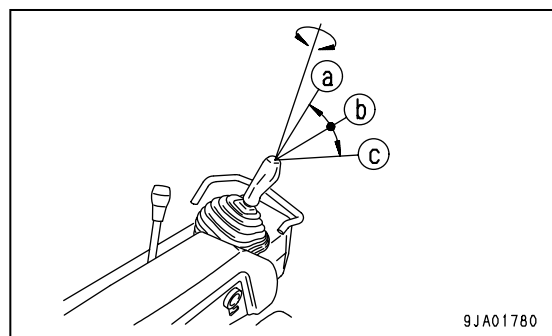
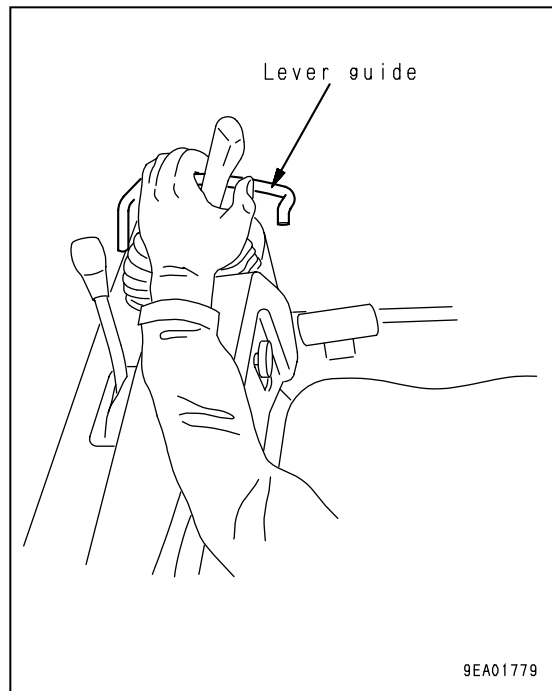
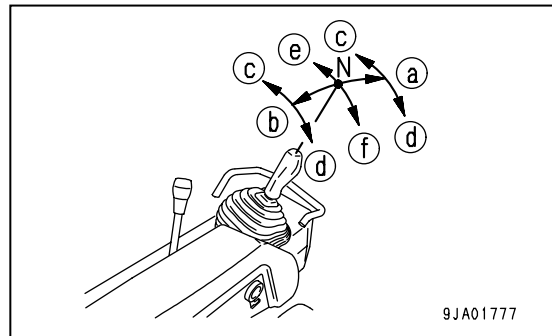
Rotate the joystick 30° to carry out gear shifting operation.

Position (a): 1st

Position (b): 2nd

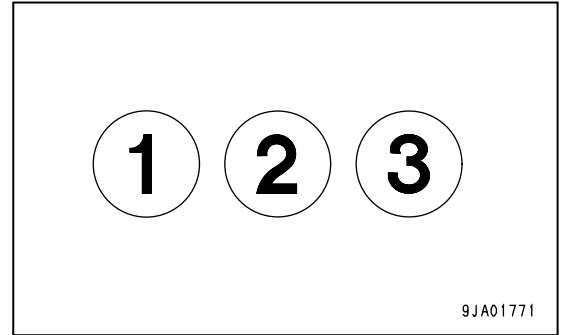
Position (c): 3rd

For the maximum travel speed in each gear speed, see "SPECIFICATIONS (PAGE 5-2)".



As the gear is shifted, one of the gear speed lamps on the front panel lights up.

- 1st: Lamp 1 lights up.
- 2nd: Lamp 2 lights up.
- 3rd: Lamp 3 lights up.

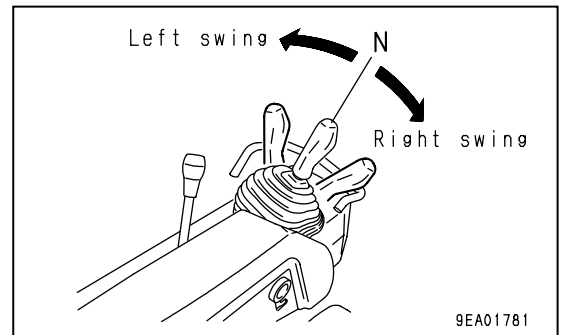


- Counterrotation turn

⚠ WARNING

- 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.
- If the steering and directional lever is not operated fully to the forward or reverse position and the lever is operated to turn the machine, the machine may carry out a counterrotation turn, so do not try to turn the machine with the lever partially operated.

If the steering and directional lever is operated partially in the direction of turn with the lever at the N(Neutral) position, the left and right tracks will rotate in opposite directions and the machine will turn smoothly on the spot. If the steering lever is operated fully, the speed of the counterrotation turn will increase.



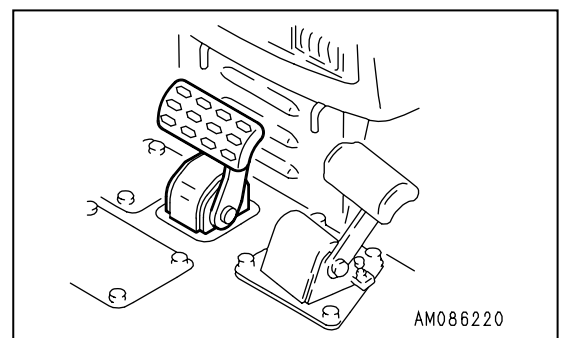
BRAKE PEDAL

⚠ WARNING

Do not place your foot on this pedal unnecessarily.

If this pedal(3) is depressed, both brakes are applied simultaneously.

Do not place your foot on this pedal unnecessarily.

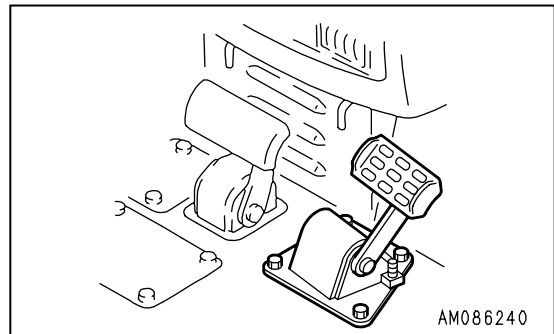


DECELERATION PEDAL

⚠ 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(4) is used to lower the engine speed or stop the engine. Depress this pedal to reduce the speed when shifting between forward and reverse or when stopping the machine.



BRAKE LOCK LEVER

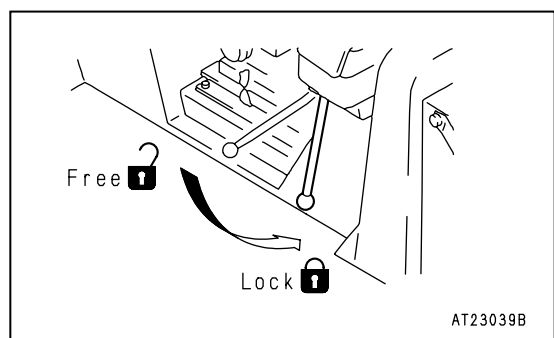
⚠ WARNING

- When the machine is parked, always set the brake lock lever to the LOCK position.
- If the brake lock lever is operated, the brake operates even while the machine is traveling. Do not operate the brake lever while the machine is traveling since it stops the machine suddenly, but operate it only in an emergency.

This lever(5) is used to apply the parking brake.

REMARK

- When the steering, directional and gear shift lever is at the FORWARD or REVERSE position, if the brake lock lever is operated to the LOCK position, the steering, directional and gear shift lever will automatically return to the N (neutral) position.
- If the brake lock lever is not at the LOCK position, the limit switch works and the engine does not start.



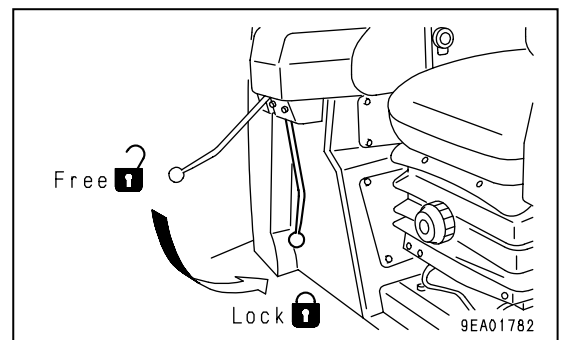
SAFETY LEVER (FOR BLADE CONTROL LEVER)

⚠ WARNING

- When standing up from the operator's seat, always set the safety lever securely to the LOCK position. If the blade control and ripper control levers are not locked and are touched by accident, it may lead to serious injury or damage.
- If the safety lever is not set securely to the LOCK position, the lock may not be applied. Check that it is in the position shown in the diagram.
- When parking the machine or when carrying out maintenance, always lower the blade to the ground, then set the safety lever to the LOCK position.

This safety lever(6) is a device to lock the blade control and ripper control levers. When it is set to the LOCK position, operations are locked.

If the blade control lever is at the FLOAT position and the safety lever is set to the LOCK position, the blade control lever is automatically returned to the HOLD position¹⁷.



BLADE CONTROL LEVER

POWER ANGLE, POWER TILTDOZER

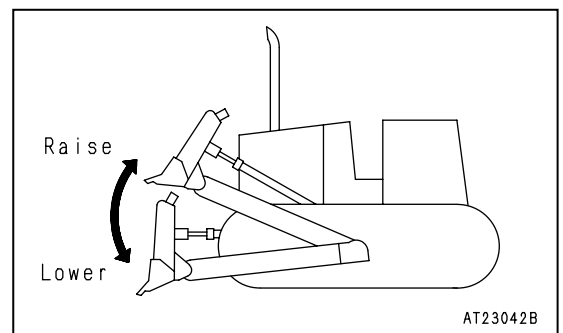
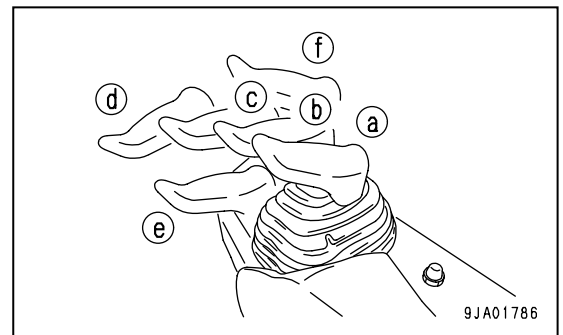
This lever(7) is used to lift, tilt, or angle the blade.

- Lifting control

- (a) RAISE:
- (b) HOLD: Blade is stopped and held in this position.
- (c) LOWER:
- (d) FLOAT: Blade will move freely according to external force.

REMARK

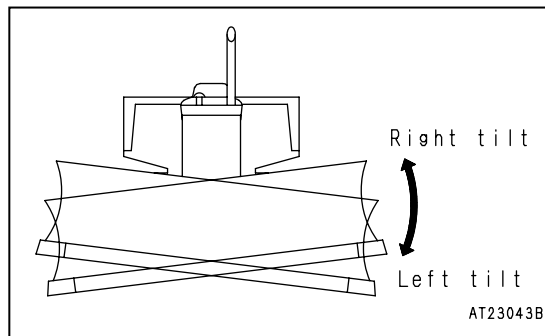
- When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.
- Before starting the engine, check that the blade control lever is at the HOLD position.
- In cold weather, it will take time for the lever to be held at the HOLD position, so hold the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



● Tilting control

(e)LEFT TILT

(f)RIGHT TILT



Tilting distance of power angle, power tiltdozer

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

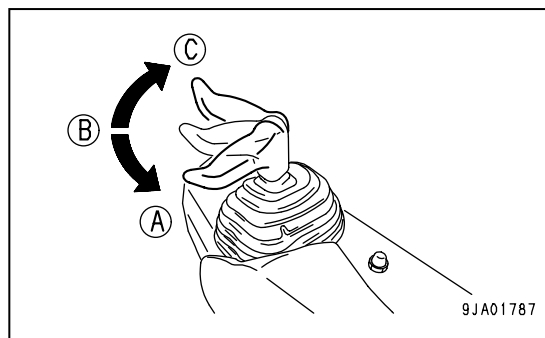
● Angling control

(A)LEFT ANGLE

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

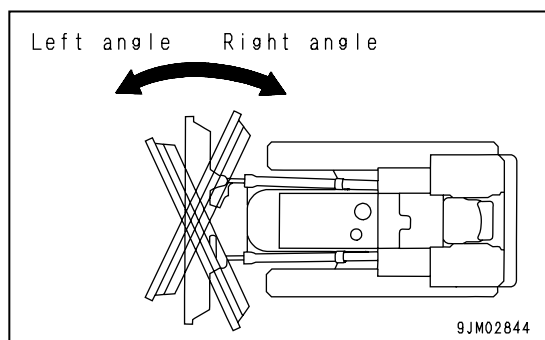
(C)RIGHT ANGLE

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



REMARK

- When performing only angling operation, be sure to set the lever in the neutral (HOLD) position and turn the knob to the right or left.
- If the angling operation is performed while the lever is not in the neutral (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.

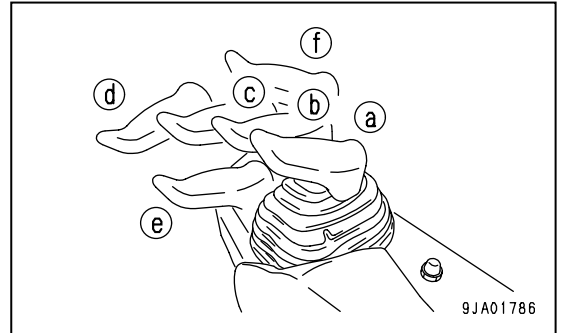


POWER TILTDOZER

This lever(7) is used to lift or tilt the blade.

- Lifting control

- (a)RAISE:
- (b)HOLD: Blade is stopped and held in this position.
- (c)LOWER:
- (d)FLOAT: Blade will move freely according to external force.

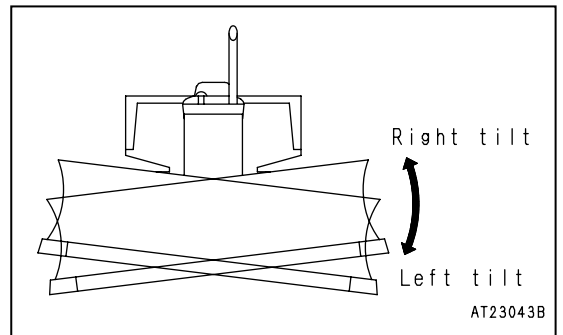
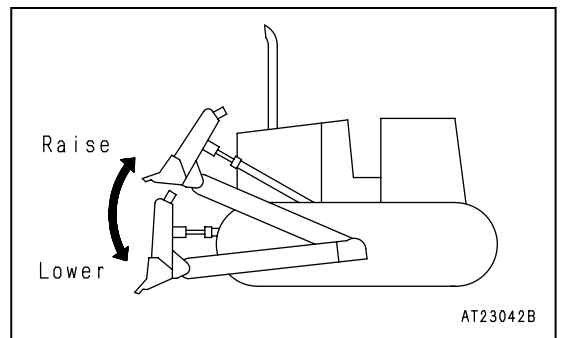


REMARK

- 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

- (e)LEFT TILT
- (f)RIGHT TILT



Tilting distance of power tiltdozer (center of blade edge)

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

FUSE

NOTICE

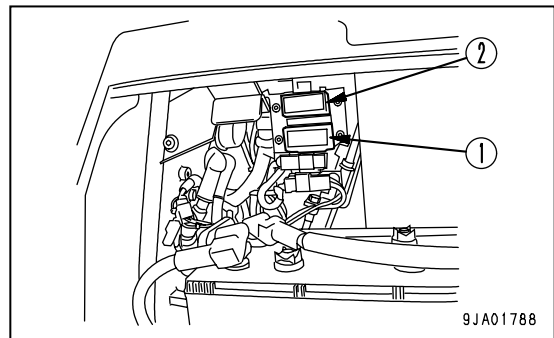
Before replacing a fuse, be sure to turn off the starting switch.

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 a fuse with another of the same capacity.

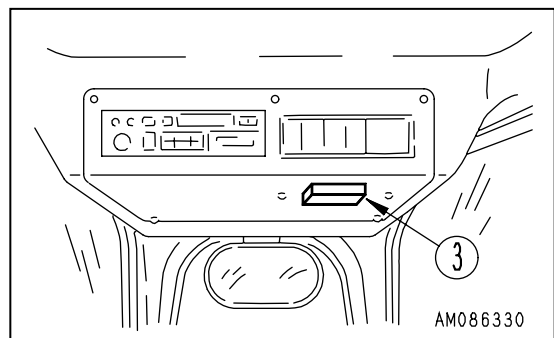
- Chassis

Fuse boxes(1) and (2) are installed under the battery cover.



- Cab (machines equipped with cab)

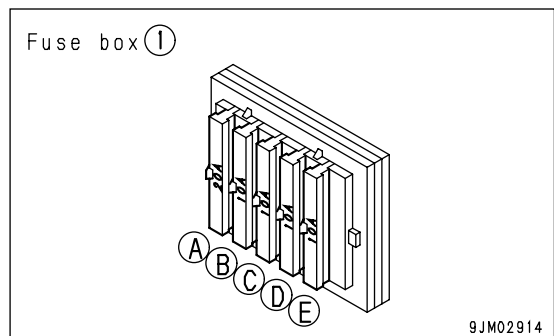
Fuse box(3) is installed at the bottom of the overhead panel.



FUSE CAPACITY AND CIRCUIT NAME

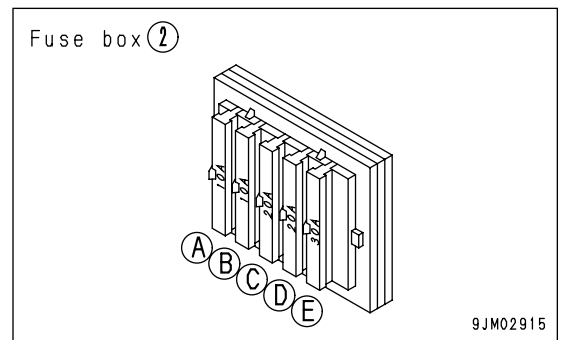
Fuse box(1)

No.	Fuse capacity	Name of circuit
(A)	20A	Head lamp, Rear working lamp
(B)	10A	Chassis power source
(C)	10A	(Spare)
(D)	10A	Horn
(E)	10A	Back-up alarm



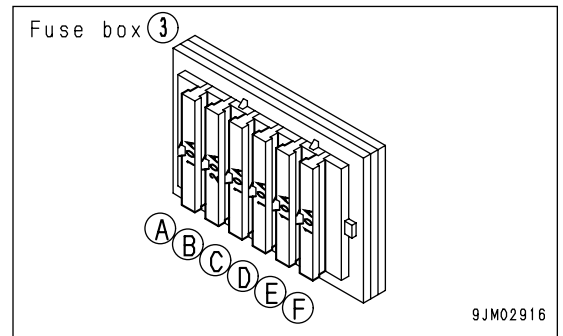
Fuse box(2)

No.	Fuse capacity	Name of circuit
(A)	10A	Cab radio, Back-up power source
(B)	10A	(Spare)
(C)	20A	Air conditioner
(D)	20A	Electric power take-out
(E)	30A	Chassis power source



Fuse box(3) (Machine equipped with cab)

No.	Fuse capacity	Name of circuit
(A)	10A	Radio memory
(B)	20A	Radio, lamps, cigarette lighter
(C)	10A	Rear wiper
(D)	10A	Right door wiper
(E)	10A	Front wiper
(F)	10A	Left door wiper



ELECTRIC POWER TAKE-OUT ADAPTER

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).

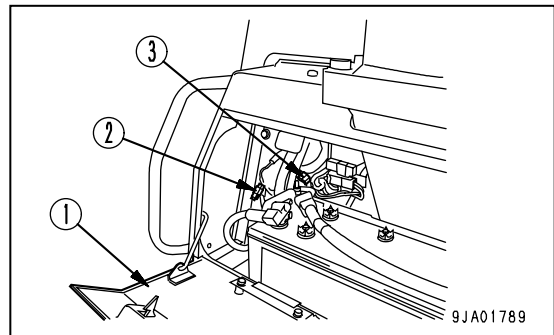
(Machine equipped with cab)

It is possible to remove the cigarette lighter and use the socket as a power supply.

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

(Machine not equipment with cab)

1. Open battery cover(1) on the left side of the machine.
2. Pull out the electric power take-out connector for the cab.
(A single-pole connector CN25(2) or a single-pole connector CN24(3) for an optional device can be used.)
Connector CN25 and CN26 are secured to the main harness with a band. When using CN25, remove it. After using it, secure it with the band again.
Connector CN24 is secured to the main harness with a tape.



Capacity of each connector:

- CN25(2): 120W(24V x 5A)
- CN24(3): 480W(24V x 20A)

REMARK

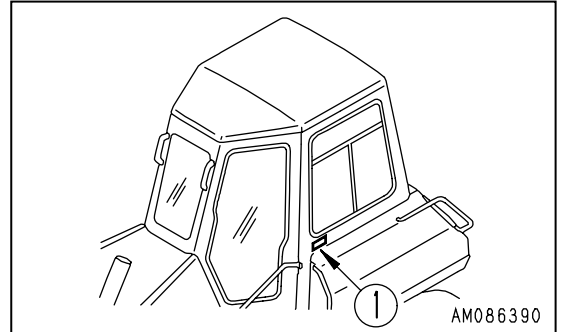
- Ground the negative wire to the body work or ROPS. Do not ground it to the rubber mounted engine or valves. This will cause failures.
- If the wire is grounded to a point where there is still paint, the electricity will not flow smoothly, so remove the paint.

DOOR-OPEN LOCK

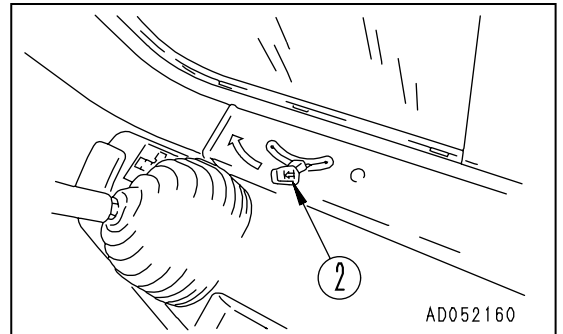
(Machine equipped with cab)

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

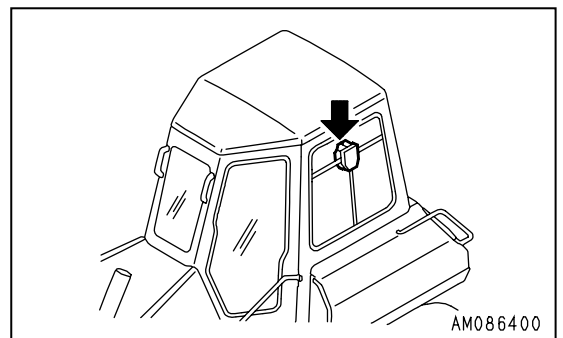
- When keeping the door open, fix it securely to the catch.
- Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.
- Keep the door locked open securely. The door may swing closed because of the vibration.

SASH GLASS INTERMEDIATE LOCK

(Machine equipped with cab)

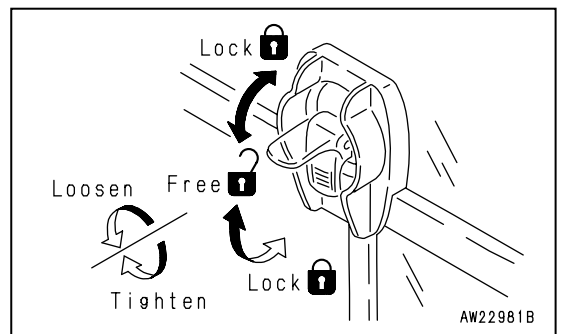
When working with the cab sash glass open, use this lock to prevent the glass from chattering.

- When the lever is at the FREE position, the glass can be opened or closed.
- When the lever is moved to the LOCK (up or down) position, the glass is fixed in position.
- If the glass is not held securely, set the lever in the FREE position and rotate clockwise to strengthen the holding power.
- To reduce the holding power, turn counterclockwise.



NOTICE

Always close the window when traveling or carrying out operations. Leaving the window open will cause the window to break.

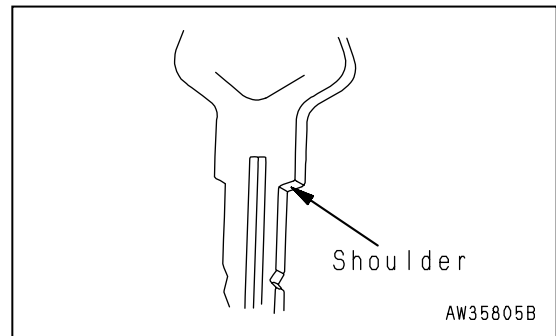


CAP, COVER WITH LOCK

The fuel tank cap, hydraulic tank cap, cab door opener, front top cover of the machine, battery check cover, both engine side covers, drain valve of the fuel tank, and inspection cover are equipped with locks.

Use the starting switch to open those caps and covers.

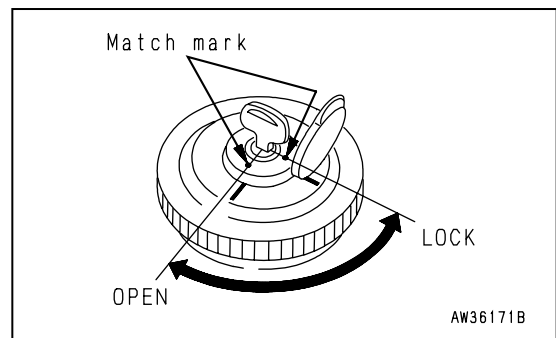
Insert the key as far as it will go to the shoulder. If the key is turned before it is inserted all the way, it may break.



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 slot with the match mark on the cap, then open the cap.



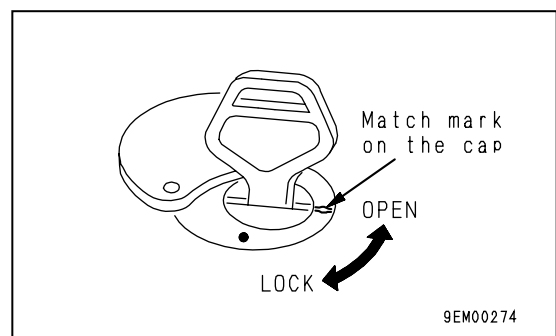
TO LOCK THE CAP

1. Turn the cap into place and insert the key into the key slot.
2. Turn the key counterclockwise and take the key out.

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 and open the cover by pulling the cover grip.



TO LOCK THE COVER

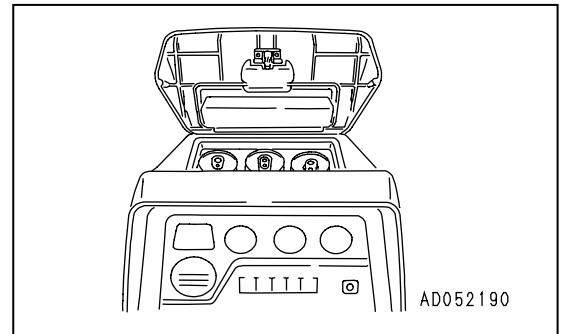
1. Close the cover and insert the key into the key slot.
2. Turn the key clockwise and take the key out.

HOT AND COOL BOX

(Machine equipped with cab)

This is at the top of the front panel. It can be used to warm or cool three canned drinks.

This is interconnected with the air conditioner: During heating, it warms up the drinks; during cooling, it cools to the drinks.

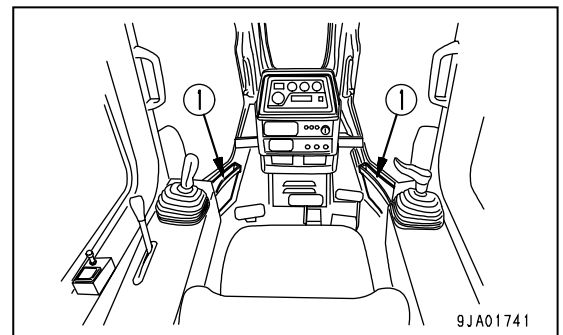


OPERATION MANUAL STORAGE

(Machine equipped with cab)

These are on the inside of the left and right doors, and can be used for keeping things or Operation & Maintenance manual.

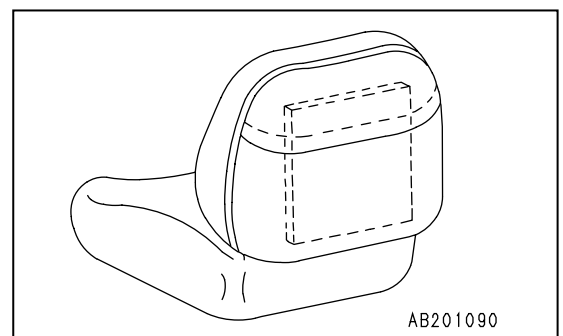
However, do not put tools or other heavy objects in the pocket. If the pocket becomes dirty, turn three clips(1), remove the pocket and wash it.



(Machine not equipment with cab)

There is a pocket on the back of the operator's seat.

Keep the operation manual in this pocket so that the operator can read it whenever necessary.

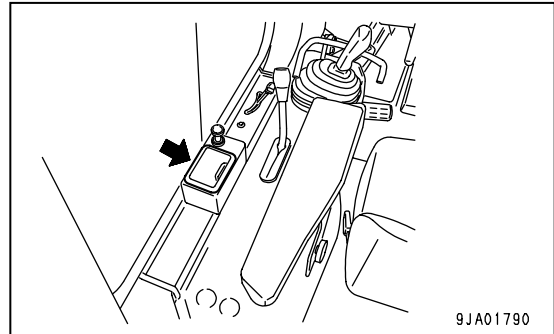


ASHTRAY

(Machine equipped with cab)

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

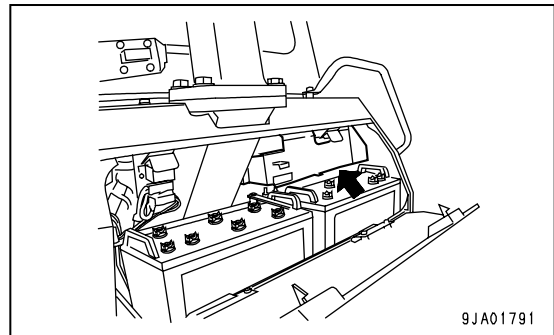
Always make sure that you extinguish the cigarette before closing the lid.



TOOL BOX

The tool box is inside the battery check cover at the rear left. Keep the tools in this box.

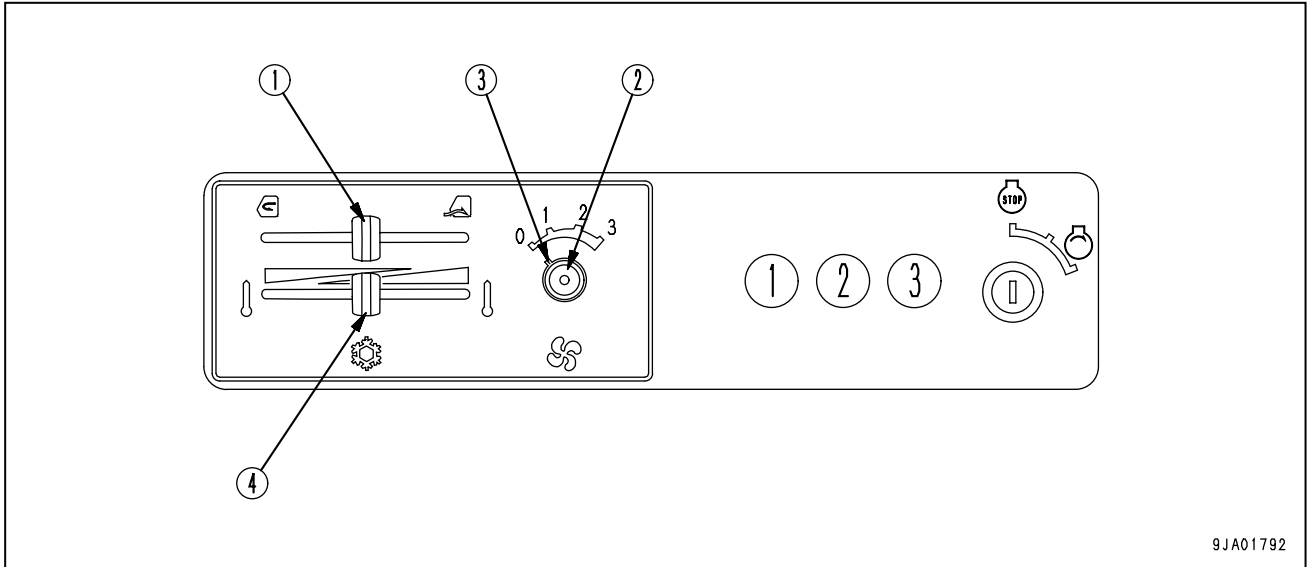
The grease pump can be put in this box without removing the nozzle.



AIR CONDITIONER

(Machine equipped with cab, air conditioner)

EXPLANATION OF PARTS



9JA01792

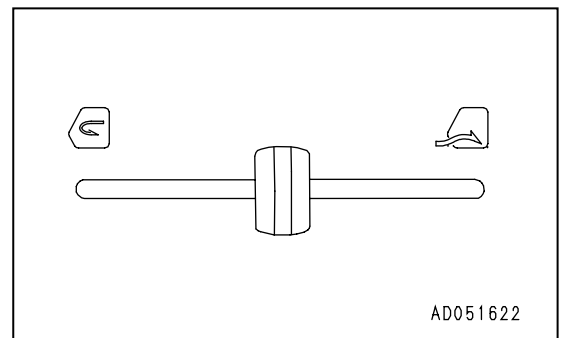
- (1) Fresh/recirc selector lever
- (2) Air condition switch

- (3) Blower switch
- (4) Temperature control lever

FRESH/RECIRC SELECTOR LEVER

This lever(1) changes the air intake port used when cooling or heating.

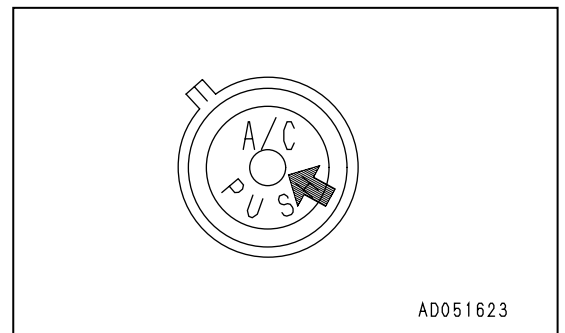
- **RECIRC:** If lever(1) is shifted to the left, the air conditioner sucks inside air. Set the lever to this position to cool or heat strongly. Ventilation or pressurizing function is not applied at this position.
- **FRESH:** If lever(1) is shifted to the right, the air conditioner sucks outside air. Set the lever to this position for normal cooling or heating. In this position, the cab is ventilated. It is also pressurized to prevent entry of dust.



AD051622

AIR CONDITION SWITCH

When the switch(2) is pressed and the blue lamp lights up, the cooling function is actuated. Use this switch for cooling or dehumidifying.

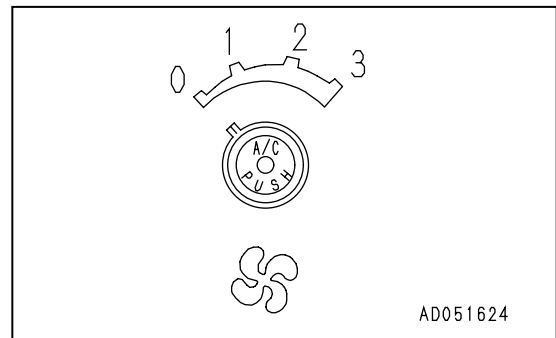


AD051623

BLOWER SWITCH

This switch(3) acts as the wind flow control switch and main switch when cooling or heating.

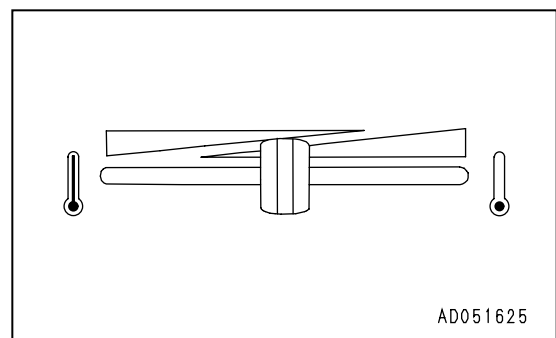
- The air flow can be set to three stages:
1(LOW) → 2(MEDIUM) → 3(HIGH).
- If the switch is set to 0, the power is switched off and the air conditioner stops.



TEMPERATURE CONTROL LEVER

This lever(4) is used to control the temperature for cooling or heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower. (The water valve is closed and the heating function is stopped.)
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher. (The water valve is opened and the heating function is started.)



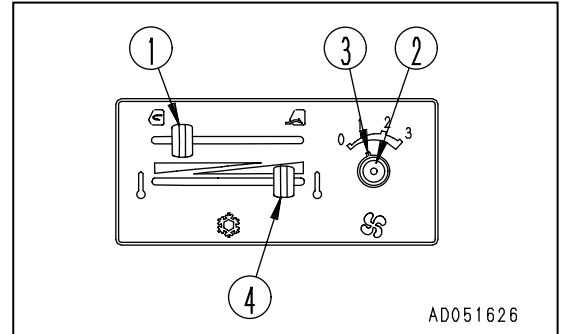
COOLING OPERATION

When the cooling operation is carried out, the inside of the cab is cooled, and at the same time the drinks inside the hot and cool box can be cooled.

COOLING (RECIRC)

When the control switch and lever are operated as shown in the diagram, a cool breeze is sent out. Use this position when strong cooling is needed.

- Press switch(2).
- Place levers(1) and(4) in the position shown in the diagram.
- Set switch(3) to the desired position.

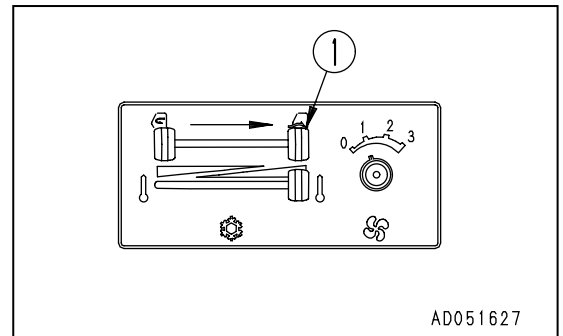


COOLING (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever 1 to FRESH to bring in fresh air. Keep the other switches at the same positions as for cooling (RECIRC). In this position, the inside of the cab is pressurized to prevent the entry of dust.

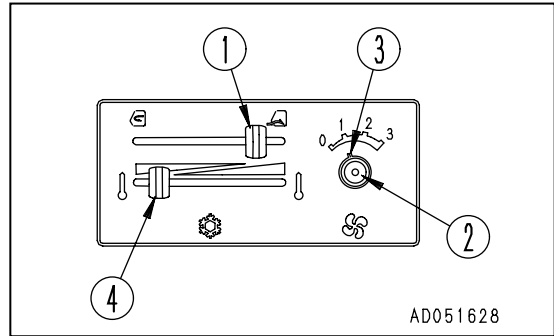
REMARK

- If the cooling effect is reduced, set FRESH/RECIRC selector lever(1) to RECIRC again. This increases the cooling effect.
- New Freon R134a is used as the refrigerant.



HEATING OPERATION

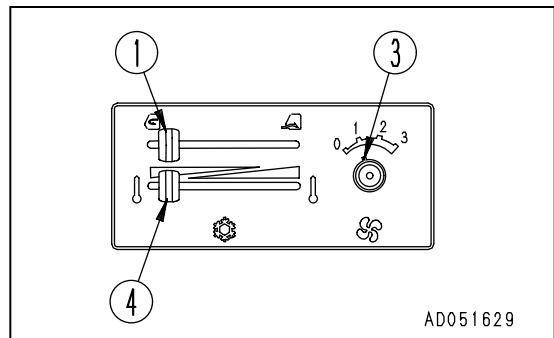
When the heating operation is carried out, the inside of the cab is heated, and at the same time the drinks inside the hot and cool box can be heated.



HEATING (RECIRC)

When the control switch and lever are operated as shown in the diagram, warm air is sent out. Use this position when strong cooling is needed.

- Place levers(1) and (4) in the position shown in the diagram.
- Set switch(3) to the desired position.

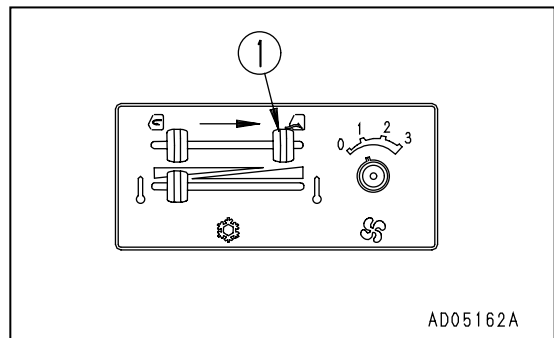


HEATING (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever(1) to FRESH to bring in fresh air. Keep the other switches at the same positions as for heating (RECIRC). In this position, the inside of the cab is pressurized to prevent the entry of dust.

REMARK

If the cab is not heated up sufficiently, turn FRESH/RECIRC selector lever(1) back to RECIRC. This increases the heating effect.



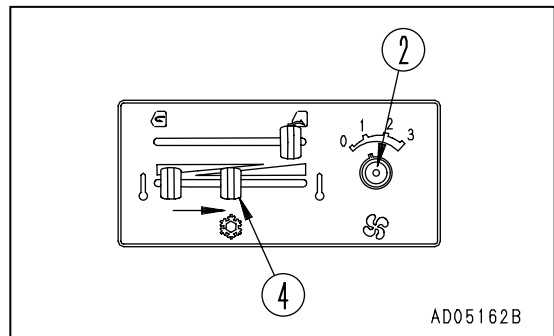
DEHUMIDIFYING AND HEATING

Push switch(2). When temperature control lever(4) is placed at the central position, dry warm air blows out.

Keep the other switches at the same positions as for heating (FRESH).

REMARK

If this is used in spring and fall on rainy days when the air inside the cab is damp, there is no problem of the windows misting up, and the cab be warmed up to a comfortable temperature.

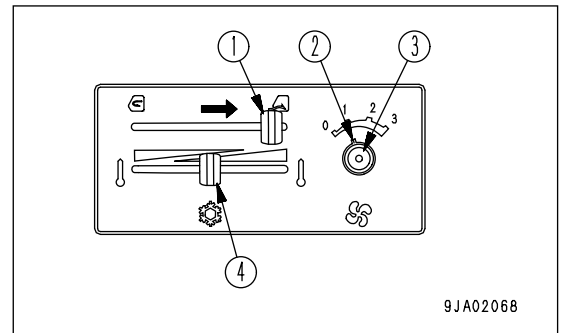


PREVENTION METHOD OF ENTRY OF DUST

Entry of dust into the cab can be prevented by starting the blower fan for the air conditioner to raise the pressure in the cab a little higher than outside.

When working in a dusty job site or when preventing dust from entering the cab, use this function.

- Close the windows and doors.
- Set lever(1) to the FRESH position.
- Set switch (2) to any of positions 1, 2, or 3.
- Set switch(3) to the desired position.
- Set lever(4) to the desired position.



PRECAUTION WHEN USING AIR CONDITIONER

CARRY OUT VENTILATION FROM TIME TO TIME WHEN USING THE COOLER.

- If you smoke when the cooler is on, the smoke may start to hurt your eyes, so turn the lever to FRESH to remove the smoke while continuing the cooling.
- When the air conditioner is used for long periods, carry out ventilation once every hour.

BE CAREFUL NOT TO MAKE THE TEMPERATURE IN THE CAB TOO LOW.

- When the cooler is on, set the temperature so that it feels slightly cool when entering the cab (5 to 6°C lower than the outside temperature). This temperature difference is considered to be the most suitable for your health, so always be careful to adjust the temperature properly.

DIRECTION OF VENTS WHEN COOLING

- 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, turn the vent fully to the rear and raise the air conditioner temperature setting slightly.

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.

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

- Depending on the condition of use, the replacement interval may be shorter.
- If the receiver is used when the desiccant has exceeded the water absorption limit, the refrigerant circuit may become clogged and cause failure of the compressor.

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.

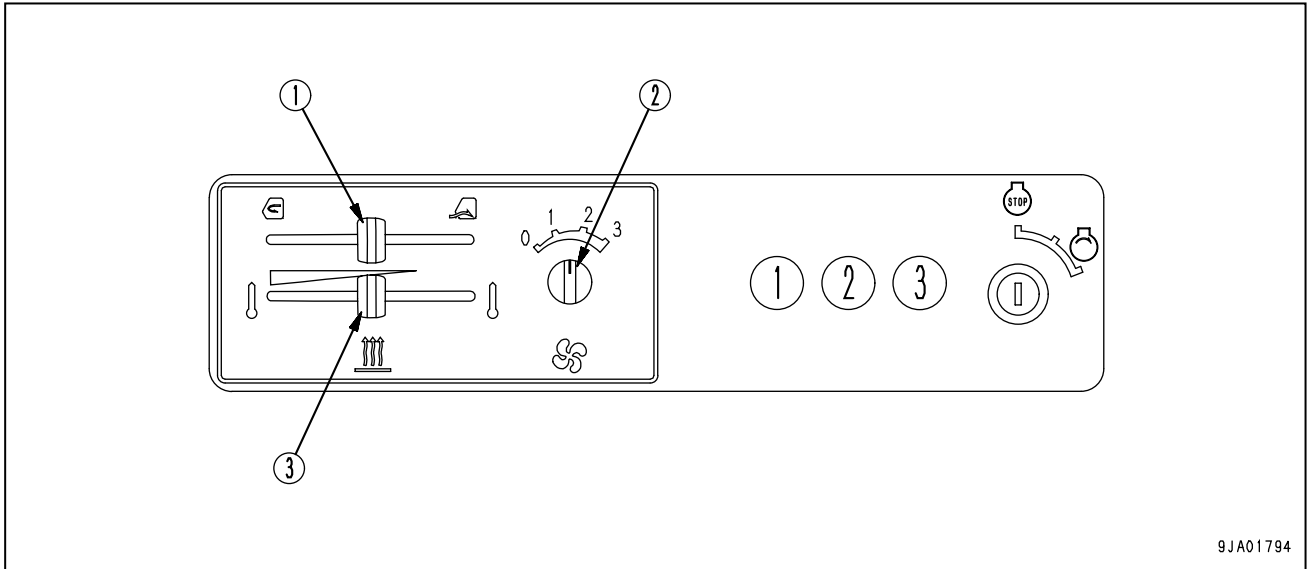
CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop. In places where there is a lot of dust, clean the air with compressed air once a week. For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (PAGE 4-48)".

HEATER

(Machine equipped with cab, heater)

EXPLANATION OF PARTS



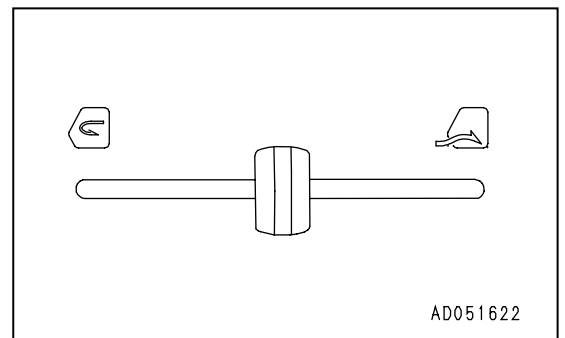
- (1) FRESH/RECIRC selector lever
- (2) Blower switch

- (3) Temperature control lever

FRESH/RECIRC SELECTOR LEVER

This lever(1) changes the air intake port used when cooling or heating.

- **RECIRC:** If lever(1) is shifted to the left, the air conditioner sucks inside air. Set the lever to this position to cool or heat strongly. Ventilation or pressurizing function is not applied at this position.
- **FRESH:** If lever(1) is shifted to the right, the air conditioner sucks outside air. Set the lever to this position for normal cooling or heating. In this position, the cab is ventilated. It is also pressurized to prevent entry of dust.

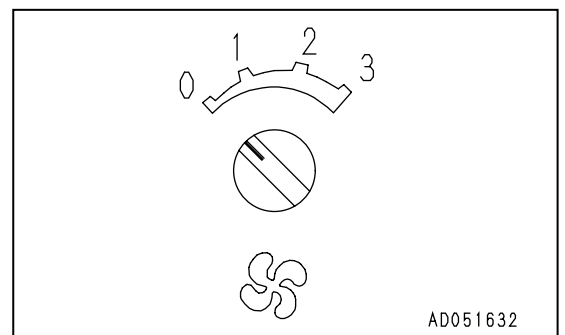


AD051622

BLOWER SWITCH

This switch(2) acts as the wind flow control switch and main switch when cooling or heating.

- The air flow can be set to three stages: 1(Low) → 2(MEDIUM) → 3(HIGH).
- If the switch is set to 0, the power is switched off and the heater stops.

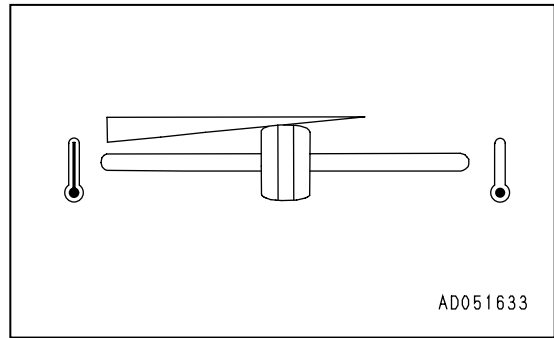


AD051632

TEMPERATURE CONTROL LEVER

This lever(3) is used to control the temperature for heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower.
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher.

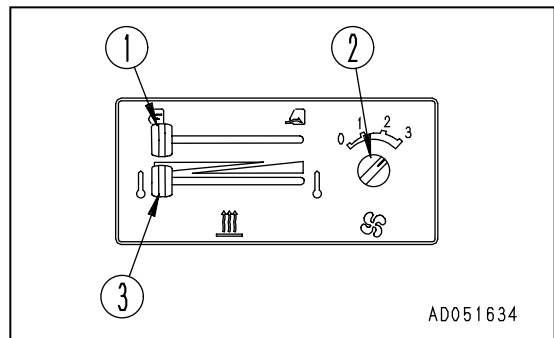


METHOD OF OPERATION

TO HEAT QUICKLY

Set the switches to the position shown in the diagram on the right to carry out heating quickly

- Set FRESH/RECIRC selector lever(1) and temperature control lever(3) to the position in the diagram on the right.
- Set blower switch(2) to position 3 (HIGH).



NOTICE

If heating is carried out continuously for a long period with the lever at the RECIRC position, the air inside the cab will become stale, so when the cab is warmed up, always set the FRESH/RECIRC selector lever(1) to the FRESH position.

In this position, the inside of the cab is pressurized to prevent the entry of dust.

MORNAL USE

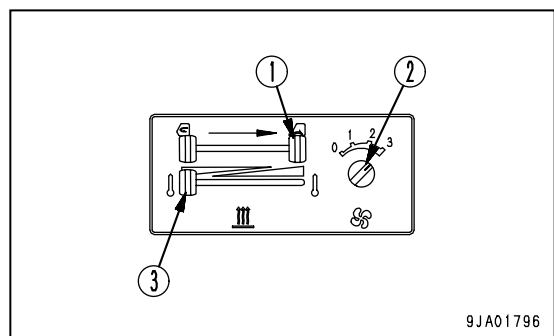
Set each switch to the desired position.

PREVENTION METHOD OF ENTRY OF DUST

Entry of dust into the cab can be prevented by starting the blower fan for the heater to raise the pressure in the cab a little higher than outside.

When working in a dusty job site or when preventing dust from entering the cab, use this function.

- Close the windows and doors.
- Set lever(1) to the FRESH position.
- Set switch(2) to the desired position.
- Set lever(3) to the desired position.



CREANING AIR FILTER

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

In places where there is a lot of dust, clean the air with compressed air once a week. For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (PAGE 4-48)".

OPERATION

CHECK BEFORE STARTING ENGINE, ADJUST

WALK-AROUND CHECK

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 abnormality 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 side when getting on or off the machine.

If the machine is at an angle, make it horizontal before checking.

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

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

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

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

2. Remove dirt and dust from around engine, battery radiator

Check if there is any dirt or dust accumulated around the engine or radiator. Check also if there is any flammable material (dead leaves, twigs, grass, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler or turbocharger. Remove all such dirt or flammable material.

3. Check for leakage of water or oil around engine

Check that there is no leakage of oil from the engine or leakage of water from the cooling system. If any abnormality is found, repair it.

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

Check that there is no oil leakage. If any abnormality 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 damage, wear, or oil leakage is found, repair the problem and tighten the bolts.

6. Check for damage to handrail, loose bolts

Repair any damage and tighten any loose.

7. Check for damage to gauges, lamps on instrument panel, loose bolts

Check that there is no damage to the panel, gauges and lamps. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

8. Check for damage to seat belt and mounting clamps

Check that there is no abnormality in the seat belt or mounting clamps. If there is any damage, replace with new parts.

CHECK BEFORE STARTING

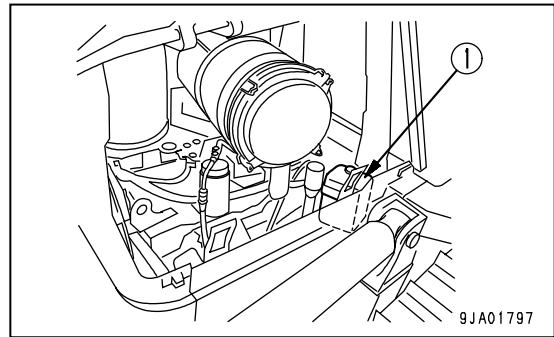
Always carry out the items of the checks in this section before starting the engine.

CHECK COOLANT LEVEL, ADD WATER

WARNING

- Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.
- 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 drain the coolant 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.

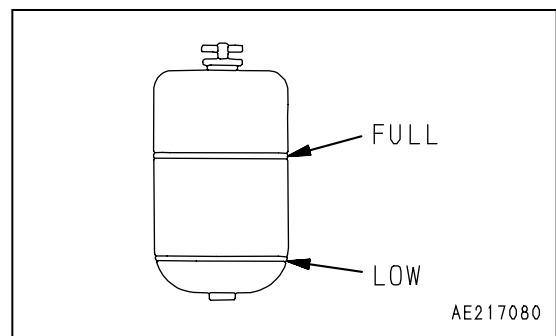
1. Open the engine side cover on the left side of the chassis, and check that the cooling water is between the FULL and LOW marks on sub-tank(1). If the water level is low, add water to the FULL level through the water filler port in sub-tank(1).



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

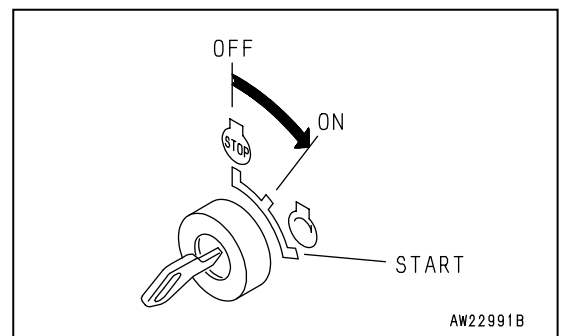
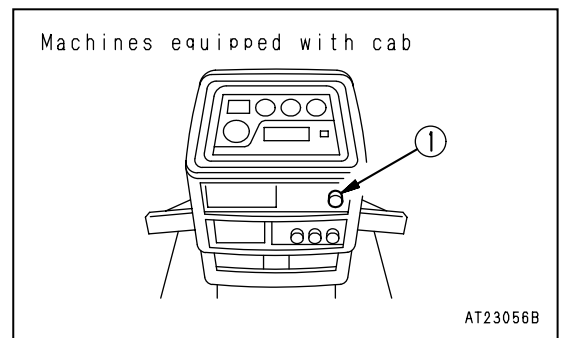
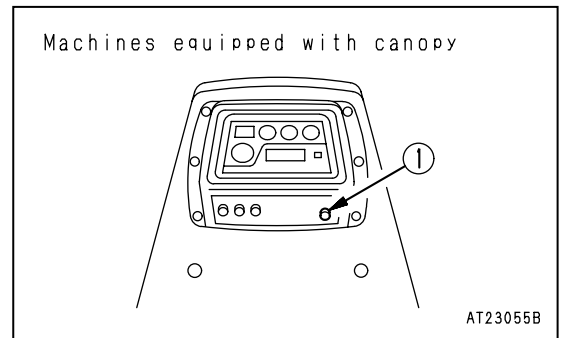


CHECKING WITH MACHINE MONITOR

1. Turn starting switch(1) to the ON position.
2. Check that all monitor lamps light up for 3 seconds, the warning lamp lights up for 2 seconds, and the alarm buzzer sounds for 1 second.

REMARK

- If the lamps do not light up, there may be a failure or disconnection in the monitor, so please contact your Komatsu distributor.
- When carrying out the checks before starting, do not rely only on the monitor. Always carry out all the items listed for "CHECK BEFORE STARTING (PAGE 3-40)".



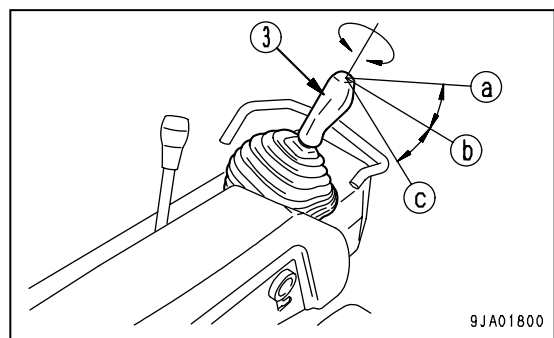
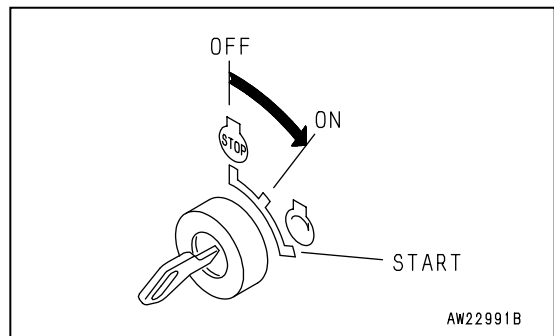
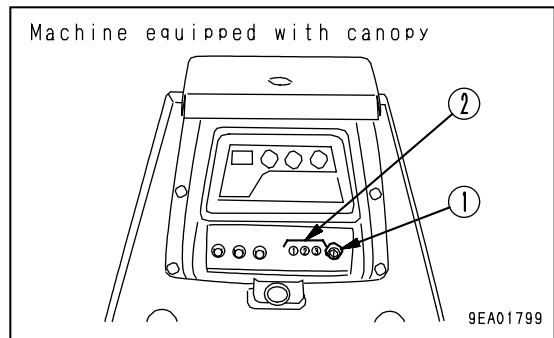
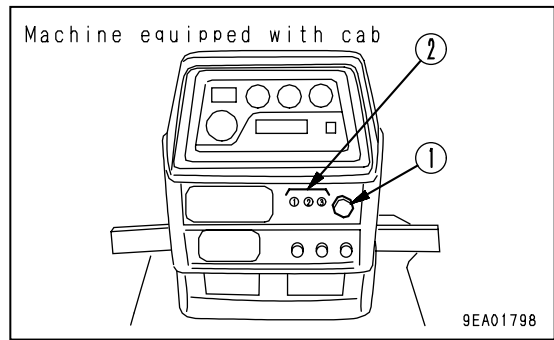
CHECK SPEED RANGE DISPLAY LAMP

1. Turn starting switch(1) to the ON position.
2. Check that only one of speed range display lamps(2) is lighting.
3. Operate steering, directional and gear shift lever(3) to shift the gear, and check that the lighting lamp changes according to the operation.

Position (a): 1st
 Position (b): 2nd
 Position (c): 3rd

REMARK

If any lamp does not light up or two or more lamps light up, or if the lighting lamp does not change even the gear is shifted, the gear speed lamp system or its wire may be broken. In this case, call your Komatsu distributor and ask for inspection.

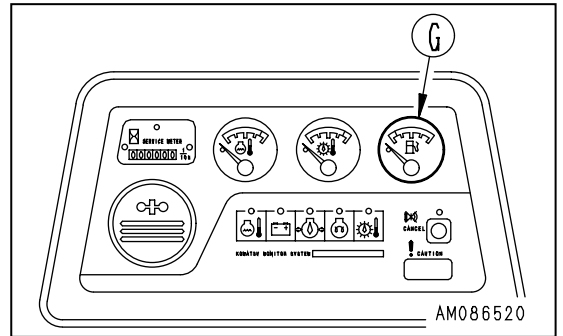


CHECK FUEL LEVEL, ADD FUEL

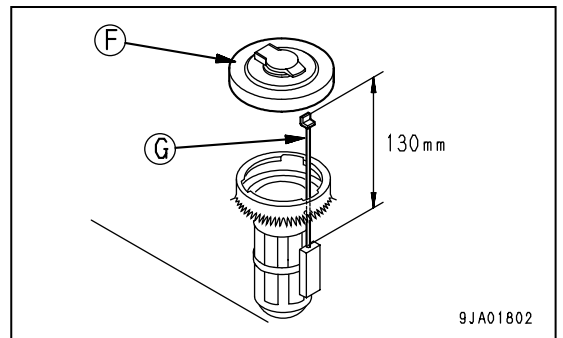
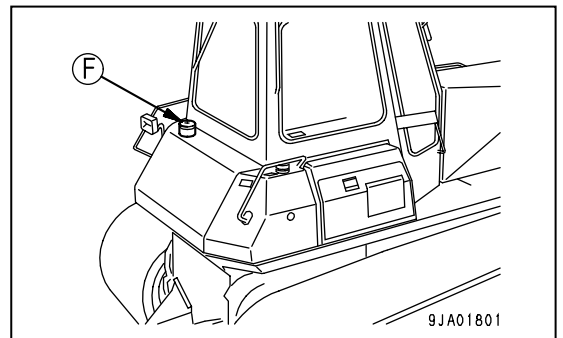
⚠ WARNING

When supplying fuel, take care not to spill it. It can catch fire.
 Wipe off any spilt fuel. If fuel has spilt over soil or sand, remove that soil or sand together.
 Fuel is highly flammable and dangerous. Do not bring fire near fuel.

1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge(G) on the monitor panel. After checking, turn the switch back to the OFF position.

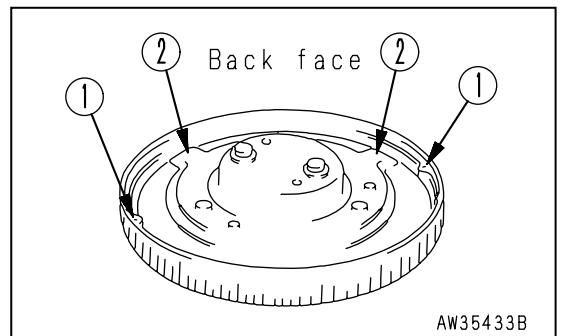


2. After completing work, fill the fuel tank through oil filler port(F).
3. If fuel filler cap(F) is opened, float gauge(G) rises to the fuel level. Check that the fuel tank is full. Check the fuel level visually and with float gauge(G).
4. If the fuel tank is not full, supply fuel through the fuel filler until float gauge(G) rises to the maximum position.
 Fuel capacity: 315 liters (83.16US gal)
 Height of tip of float gauge(G) when fuel tank is full:
 Approx. 130mm (5.1in) above top of fuel tank
5. After supplying fuel, push down float gauge(G) straight with fuel filler cap(F) and tighten fuel filler cap(F) securely, taking care not to catch float gauge(G) in claw(2) of fuel filler cap(F).



REMARK

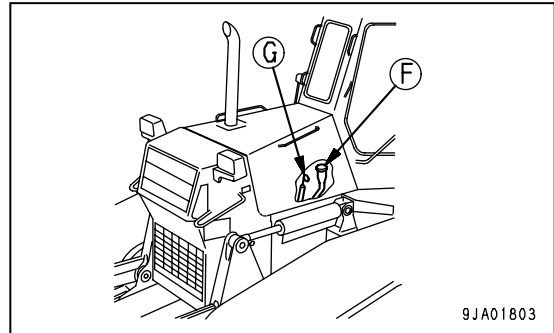
If breather hole (1) on the cap is clogged, the pressure in the tank will drop and fuel will not flow.
 Clean the hole from time to time.



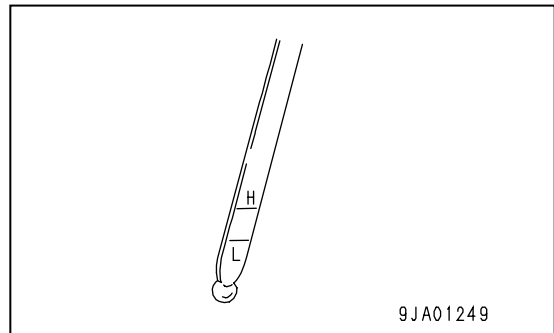
CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL**⚠ WARNING**

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 the engine side cover on the left side of the chassis.
2. Remove dipstick(G) and wipe the oil off with a cloth.
3. Insert dipstick(G) fully in the oil filler pipe, then take it out again.



4. The oil level should be between the H and L marks on dipstick(G).
If the oil level is below the L mark, add engine oil through oil filler(F).
5. If the oil is above the H mark, drain the excess engine oil from drain plug(P), and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

**REMARK**

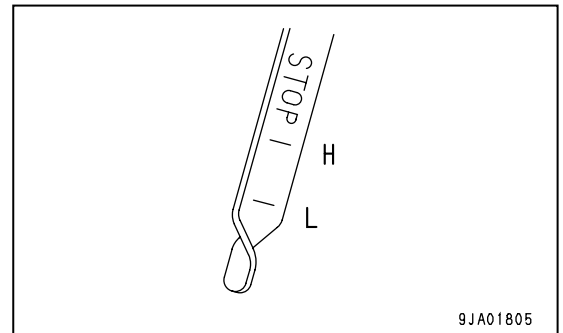
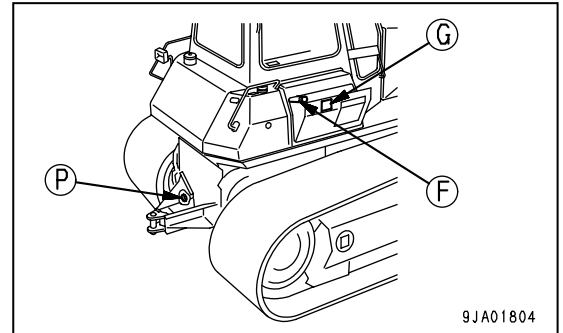
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.

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 at the right side of the machine.
2. Remove dipstick(G), and wipe the oil off with a cloth.
3. Insert dipstick(G) fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick(G).
If the oil level is below the L mark, add engine oil through oil filler(F).
5. If the oil is above the H mark, drain the excess engine oil from drain plug(P), and check the oil level again.
6. If the oil level is correct, tighten the oil filter cap securely.



REMARK

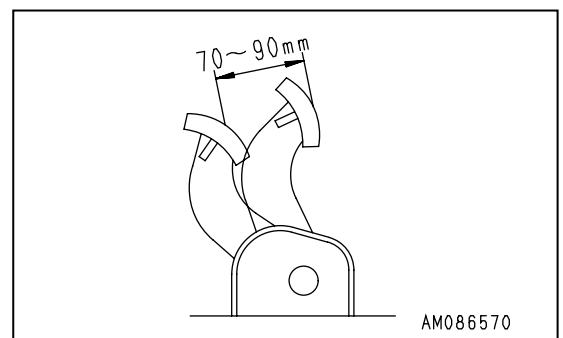
- If the machine is at an angle, make it horizontal before checking.
- When stopping the engine, check the oil level.
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.

CHECK BRAKE PEDAL TRAVEL

WARNING

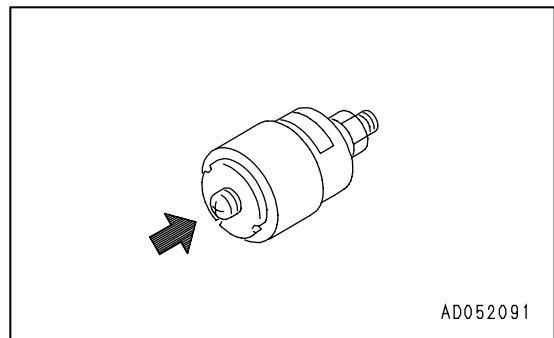
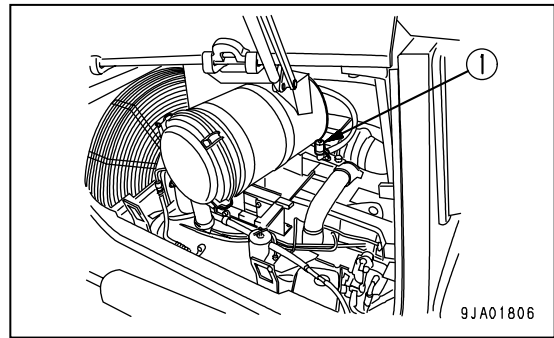
If the brake pedal stroke is not 70 to 90mm (2.8 to 3.5in) (below 70mm or over 90mm), the brake and steering force is too strong or insufficient. If the stroke is 91mm (3.6in) or longer, adjust it.

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



CHECK DUST INDICATOR

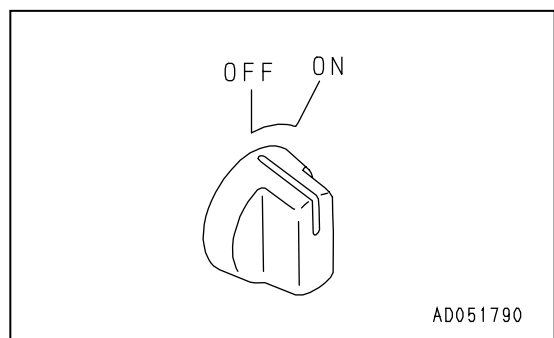
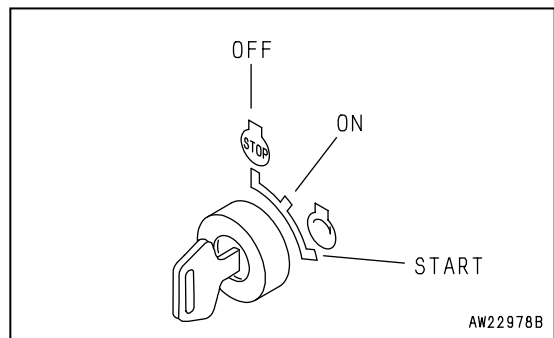
1. Open the engine side cover on the left side of the chassis, and check that the red piston has not appeared in the transparent portion of dust indicator(1).
2. If the red piston has appeared, clean or replace the element immediately.
For details of the method of cleaning the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-19)".
3. After checking, cleaning, and replacing, press the knob of dust indicator(1) to return the red piston to its original position.



CHECK THAT LAMPS LIGHTS UP

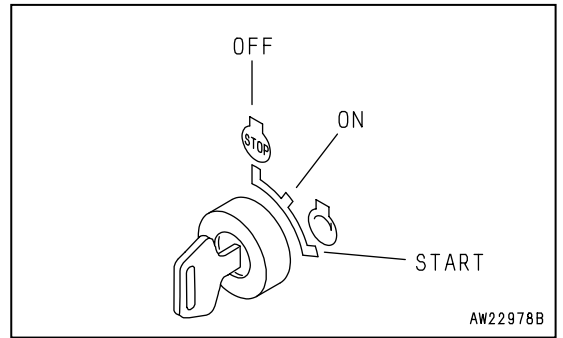
Check that the head lamp, rear lamp, additional working lamp (if equipped), and instrument lamp light up normally and they are free from stain and damage.

1. Insert the key into starting switch and turn the key to the ON position.
2. Turn the head lamp switch, the rear lamp switch and the additional working lamp to the ON position and check that the head lamps and rear lamps light up.
If the lamps do not light up, there is probably a broken bulb or disconnection in the wiring, so contact your Komatsu distributor for repairs.

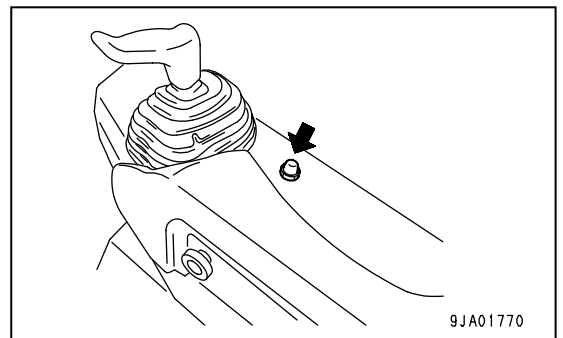


DOES THE HORN SOUND NORMALLY?

1. Insert the key into starting switch and turn the key to the ON position.

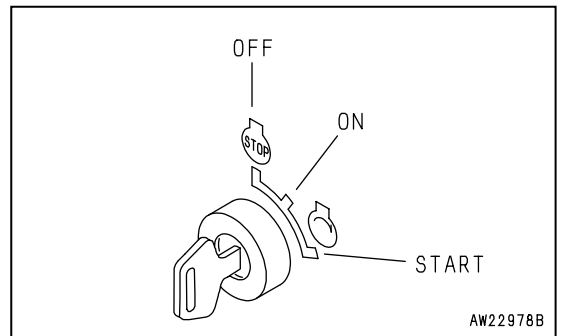


2. Push the horn switch and check that the horn sounds.

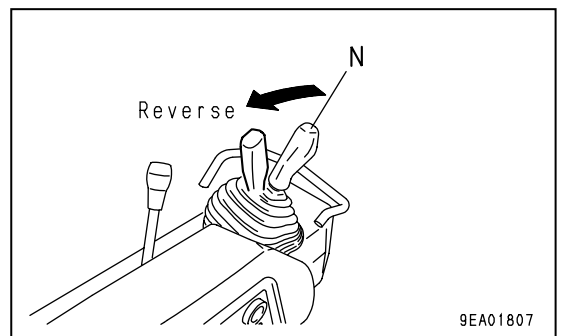


CHECK BACK-UP ALARM SOUND

1. Insert the key into starting switch and turn the key to the ON position.



2. Set the steering, directional and gear shift lever in the REVERSE position. The buzzer must sound immediately at this time. The buzzer keeps sounding until the steering, directional and gear shift lever is set to the NEUTRAL or FORWARD position.

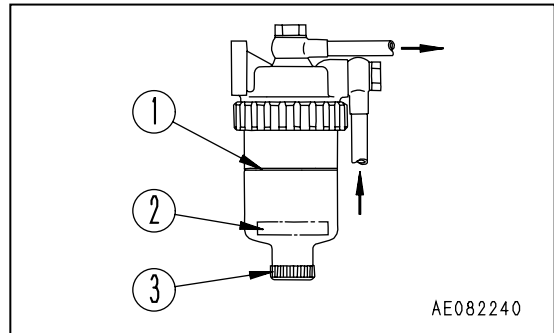


CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER

(If equipped)

The water separator separates water mixed in the fuel. If float (2) is at or above red line (1) , drain the water according to the following procedure.

1. Loosen drain plug (3) and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug (3).
3. 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 "EVERY 500 HOURS SERVICE (PAGE 4-49)".



ADJUSTMENT

ADJUST OPERATOR'S SEAT

⚠ WARNING

- Adjust the seat position at the beginning of each shift or when operators change.
- Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.

(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: 160mm (6.3in) (8 stages)

(B) Weight adjustment of seat

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

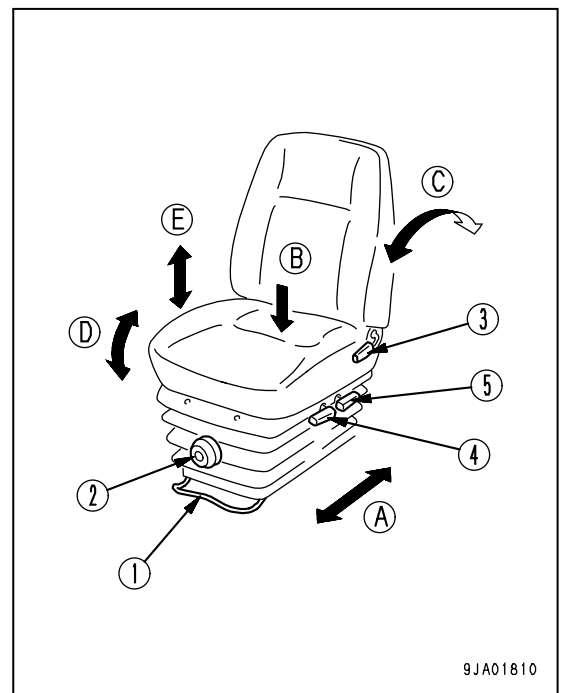
The weight can be adjusted to 50 to 120kg (110 to 265lb).

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) Adjuster reclining angle

NOTICE

When reclining the seat back to the rear, check the space behind, and adjust to a suitable position.



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Pull lever(3), set the seatback to a position where it is easy to operate, then release the lever.

(D) Seat angle adjustment

- Front angle adjustment of seat (5 stages)

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

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

To lower the rear of the seat, apply your weight to the rear of the seat, 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, 60mm (2.4in))

ADJUST ARM REST

The height of the armrests on both sides of the operator's seat can be adjusted to three levels. After adjusting the operator's seat, adjust the height of the armrests properly.

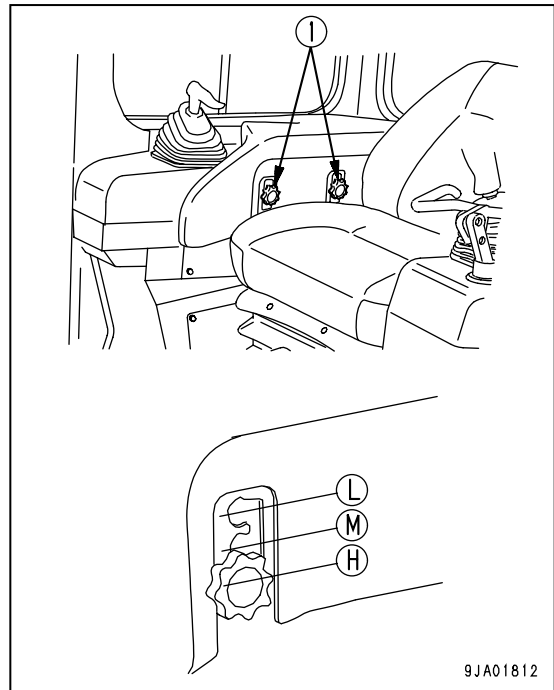
1. Loosen knobs(1) on both sides of the operator's seat.
2. Move the armrests on both sides of the operator's seat forward, then adjust their height to (H), (M), or (L).

(H): High

(M): Medium

(L): Low

3. Move back both armrests.
4. Tighten knobs(1) securely.



USING SEAT BELT

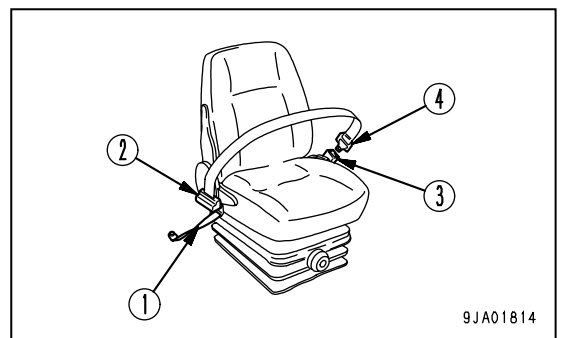
Always install a seat belt on machines equipped with ROPS.

WARNING

- Before fitting the seat belt, check that there is no abnormality in the mounting bracket and mounting belt of the belt. If the belt is worn or damaged, replace it.
- Replace the seat belt every three years, even if their outside is free from abnormality. The year of manufacture is woven on the back side of the belt.
- Always fasten the seat belt before starting operations.
- Always use the seat belt during operations.
- Do not twist the left or right side of the seat belt when fastening it.

FASTENING AND REMOVING BELT

1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is pressed against the backrest.
2. 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.
3. 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.
4. 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

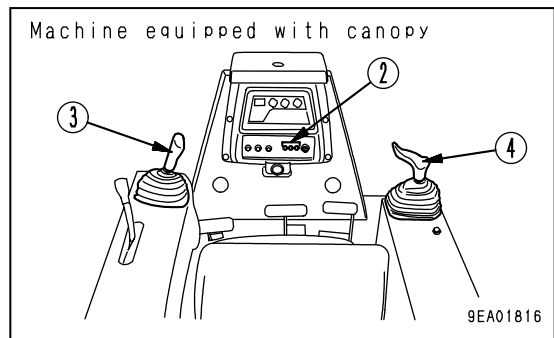
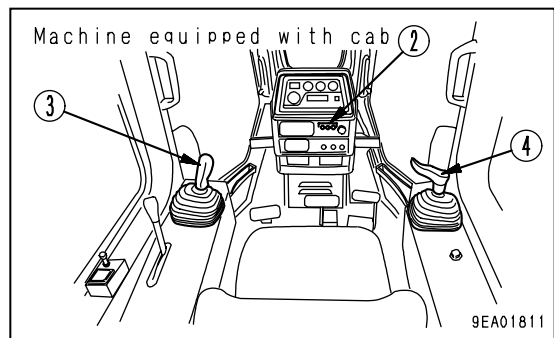
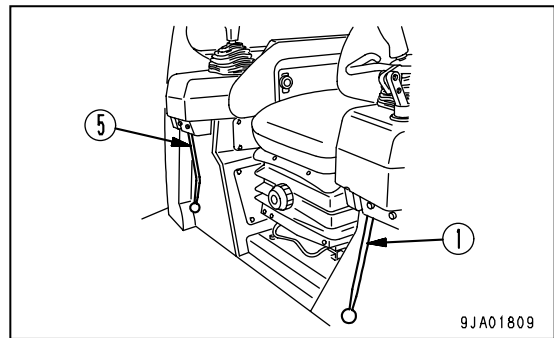
If the belt is locked before the tongue is inserted in the buckle, let it return to the wind-in mechanism, then repeat the above procedure from the first.

5. Pull the belt to check that it is securely locked in position.
6. When removing the belt, press the red button on buckle(3). The belt will automatically be wound in. 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 $24.5 \pm 4.9 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.5 \text{ kgf}\cdot\text{m}$, $18.1 \pm 3.6 \text{ lbf}\cdot\text{ft}$). If the belt surface is scratched or frayed or if the fittings are broken or deformed, replace the seat belt unit.

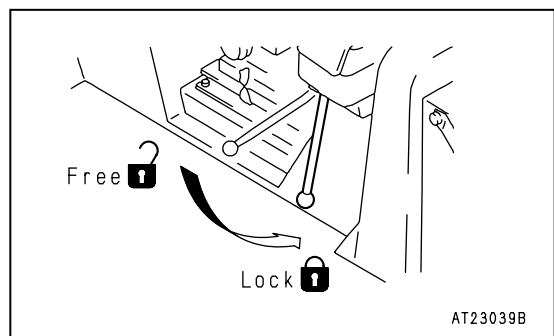
OPERATION AND CHECK BEFORE STARTING ENGINE

WARNING

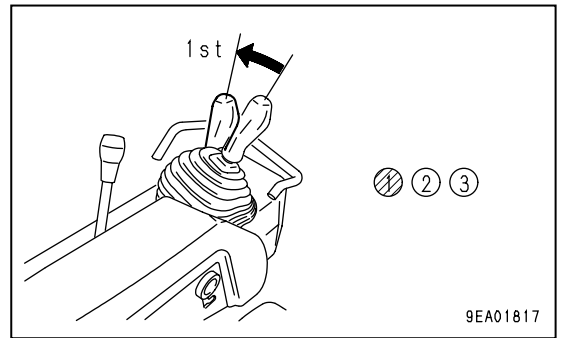
If the work equipment control levers are touched by accident, the work equipment may move suddenly. When leaving the operator's compartment, always set the safety lever securely to the LOCK position.



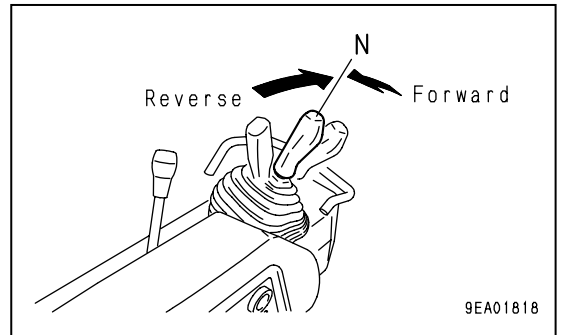
1. Check that the brake pedal is locked with brake lock lever(1). If this lever is not at the LOCK position, the engine will not start.



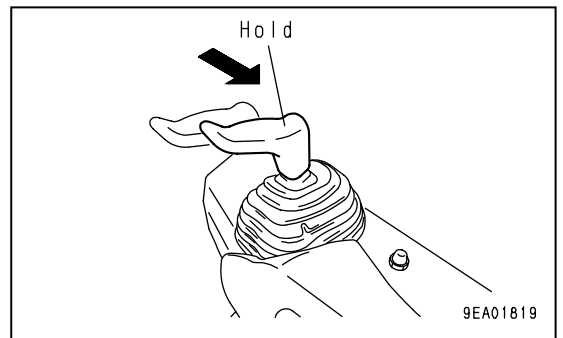
- 2. Check that speed range display lamp(2) shows 1st.



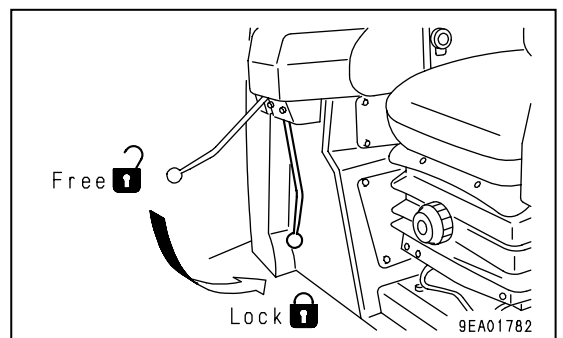
- 3. Check that steering, directional and gear shift lever(3) is at the N (neutral) position.



- 4. Check that the blade is lowered to the ground and that blade control lever(4) is at the HOLD position.



- 5. Check that the safety lock lever(5) is locked.



STARTING ENGINE

NORMAL STARTING

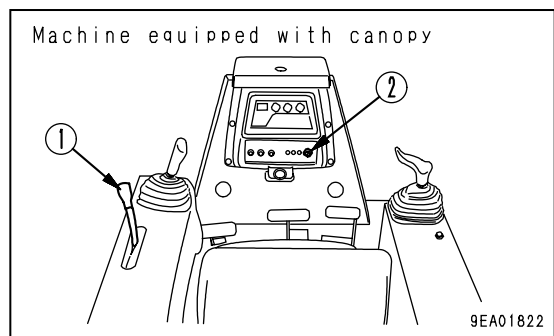
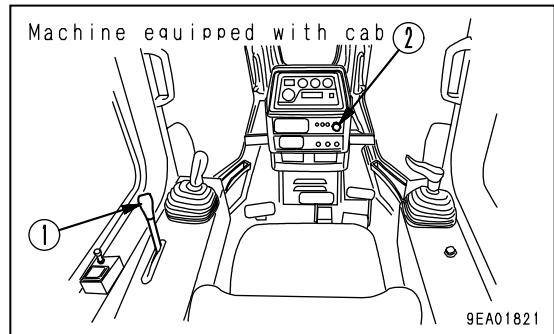
WARNING

- 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.

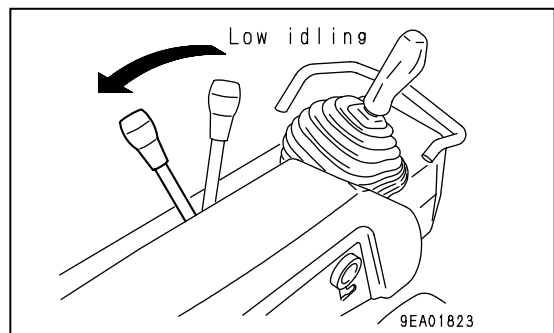
NOTICE

Do not keep the starting motor rotating continuously for more than 20 seconds.

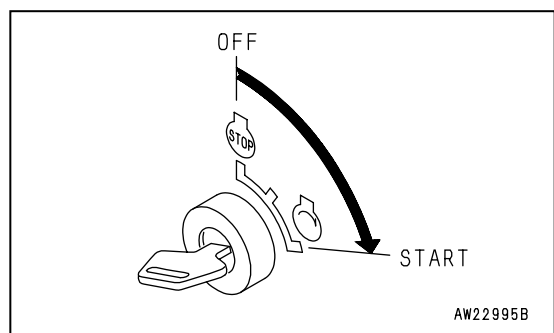
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.



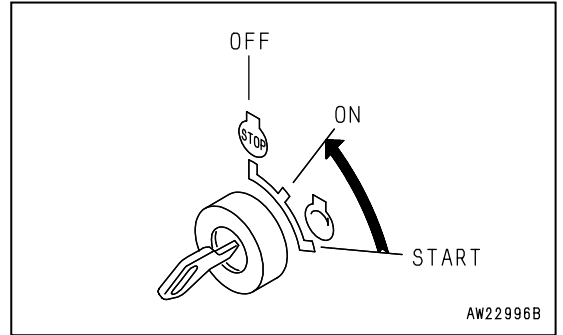
1. Pull fuel control lever(1) to a position midway between the low idling and full speed positions.



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

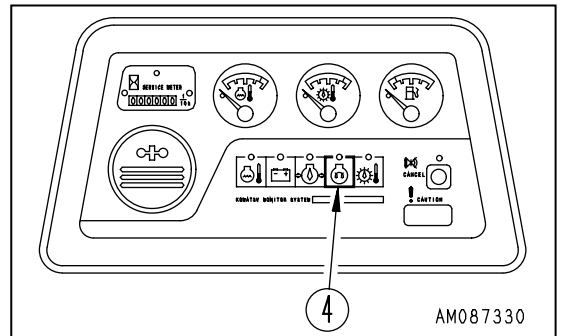
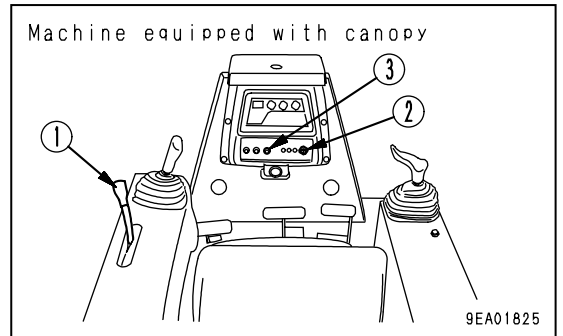
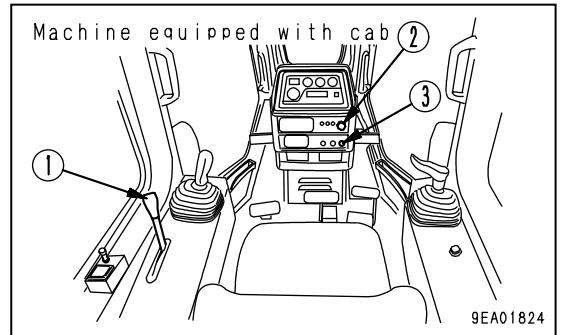


STARTING IN COLD WEATHER

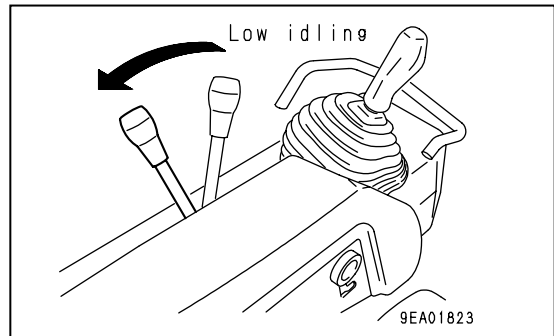
When starting in low temperatures, do as follows.

⚠ WARNING
Never use starting aid fluids as they may cause explosions.

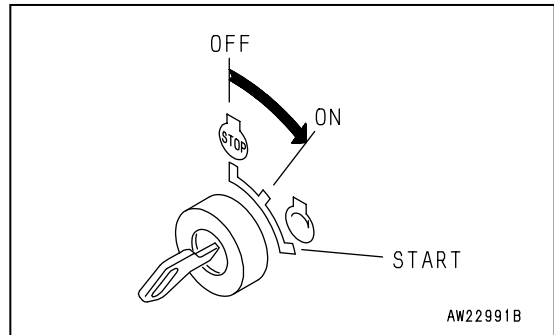
NOTICE
 Do not keep the starting motor rotating continuously for more than 20 seconds.
 If the engine fails to start, repeat steps 2 and 3 after waiting for about 2 minutes.



1. Pull fuel control lever(1) to a position midway between the low idling and full speed positions.



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



3. Carry out preheating.
There are the following two ways of carrying out preheating. First use the convenient automatic preheating system.
For operating method, see the section of "AUTOMATIC PREHEATING (PAGE 3-57)" and "MANUAL PRE-HEATING (PAGE 3-58)".

AUTOMATIC PREHEATING

1. Turn glow switch(3) to the AUTO position.
When it is turned to the AUTO position, preheating is automatically carried out according to the ambient temperature. Lamp(4) lights up during the preheating operation. When the preheating is completed, lamp(4) will go out.

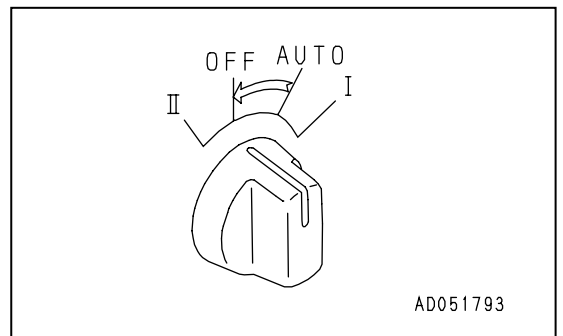
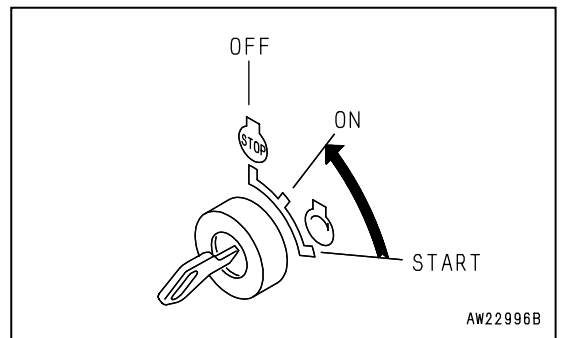
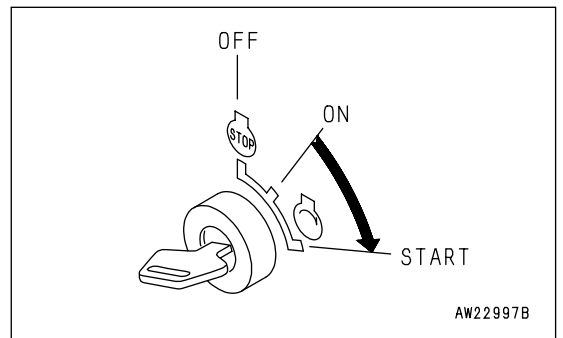
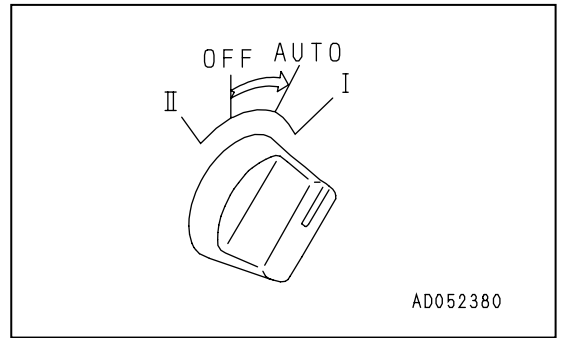
2. When the preheating is completed, turn the key in starting switch(2) to the START position to start the engine.

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

4. After starting the engine, return glow switch(3) to the OFF position.

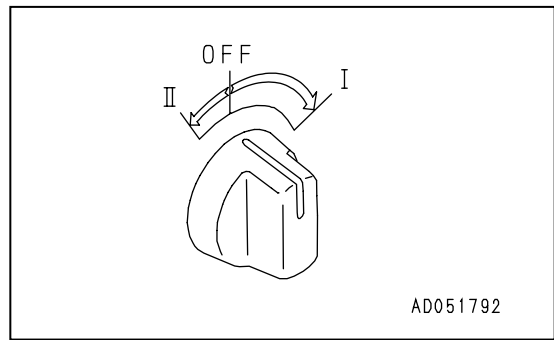
REMARK

If the engine can not start after automatic preheating, start it using manual preheating.



MANUAL PREHEATING

1. Turn glow switch(3) to position I or II.
Lamp(4) lights up during the preheating operation.
When the preheating is completed, release the switch.
The key will then return automatically to the following position.
From position I, it will return to AUTO
From position II, it will return to OFF

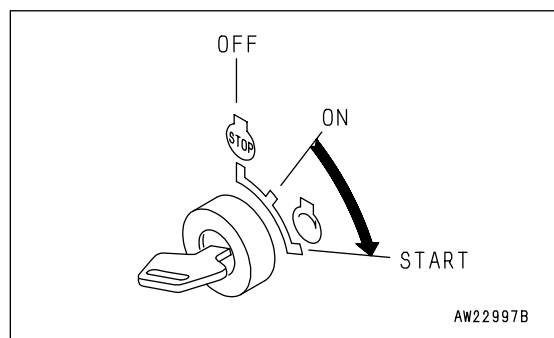


The preheating times are as shown below.

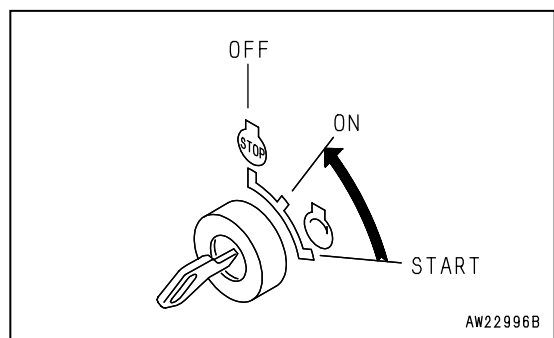
Ambient temperature	Preheat time
0°C to -5°C (32°F to 23°F)	-
-5°C to -10°C (23°F to 14°F)	15 seconds
-10°C to -20°C (14°F to -4°F)	30 seconds
-20°C to -30°C (-4°F to -22°F)	45 seconds

If the preheating time is too long or too short, the engine will not start easily. Observe the correct preheating time.

2. When the preheating is completed, turn the key in starting switch(2) to the START position to start the engine.



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



OPERATIONS AND CHECKS AFTER STARTING ENGINE

After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

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 running-in the machine for the initial 100 hours (as indicated by the service meter).

During running-in operations, follow the precautions described in this manual.

Precautions for running-in

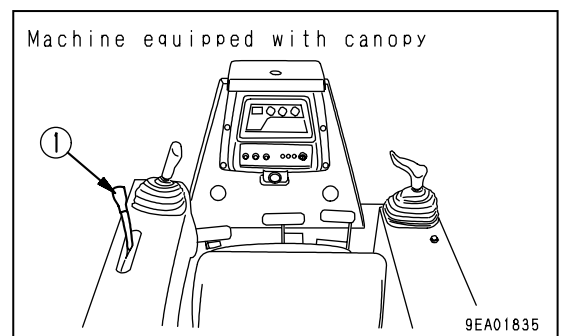
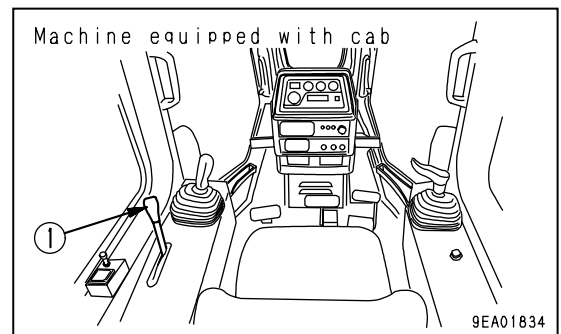
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

WARMING UP OPERATIONS

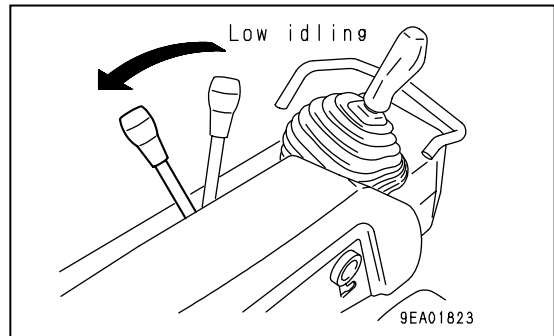
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

NOTICE

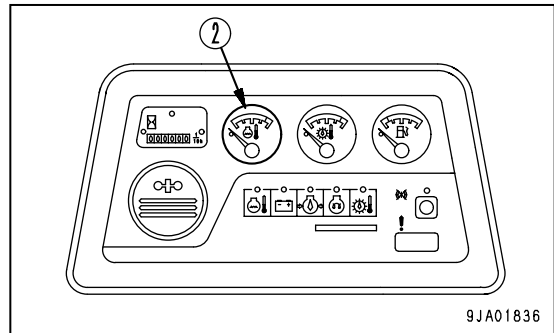
Avoid abrupt acceleration until warm-up run is completed. Do not run the engine at low idling or high idling for more than 20 minutes. If it is necessary to run the engine at idling, apply a load or run at a medium speed from time to time.



1. Pull fuel control lever(1) to the center position between LOW IDLING and HIGH IDLING 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 at light load until engine water temperature gauge(2) falls within the white range.
3. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

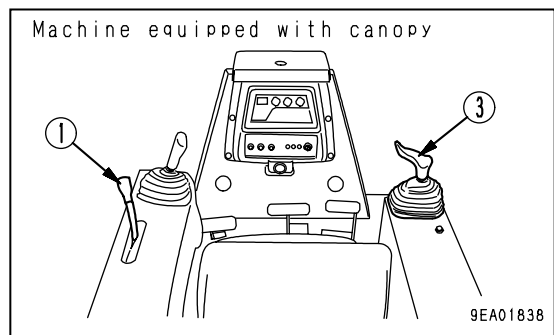
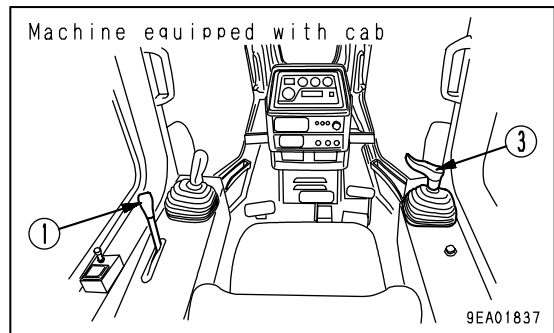


STARTING IN COLD WEATHER

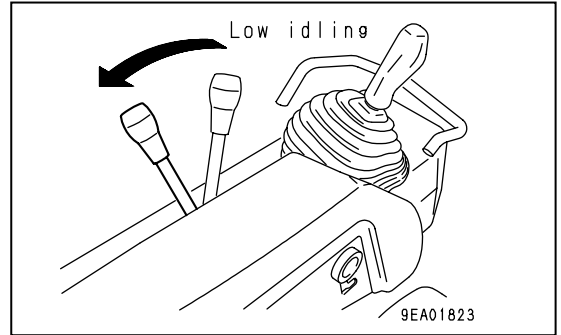
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

NOTICE

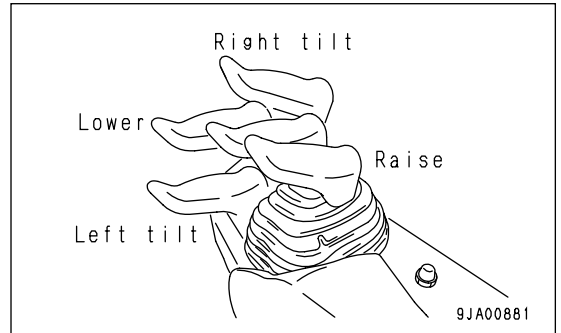
Avoid abrupt acceleration until warm-up run is completed. Do not run the engine at low idling or high idling for more than 20 minutes. If it is necessary to run the engine at idling, apply a load or run at a medium speed from time to time.



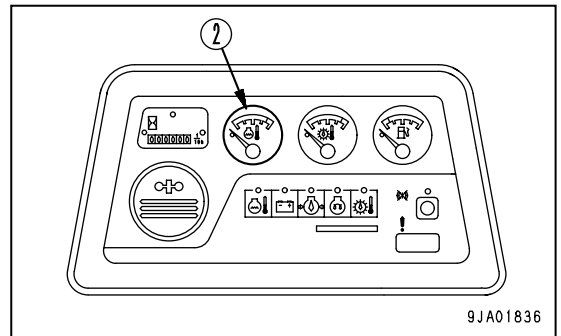
1. Pull fuel control lever(1) to a position midway between the low idling and full speed positions, run the engine at a mid-range speed, and continue to run under no load for approx. 10 minutes.



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



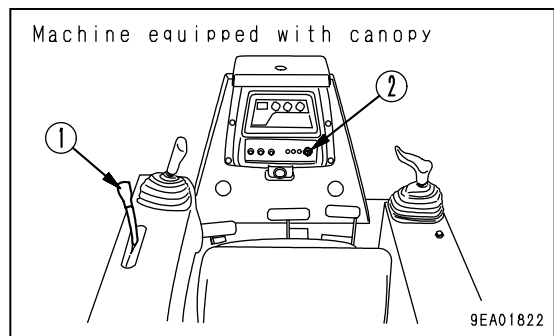
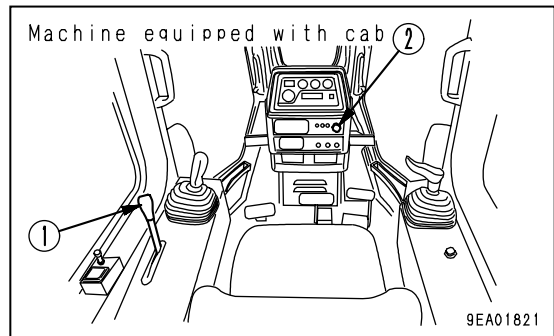
4. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it. Continue to run the engine at light load until engine water temperature gauge(2) falls within the white range.
5. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.



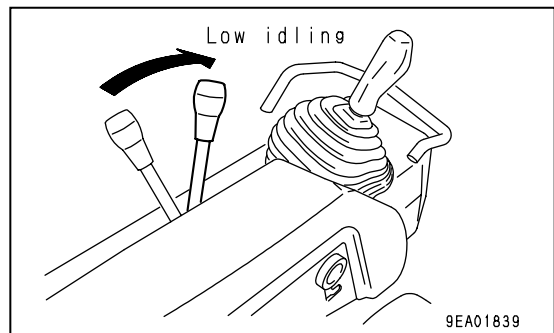
STOPPING ENGINE

NOTICE

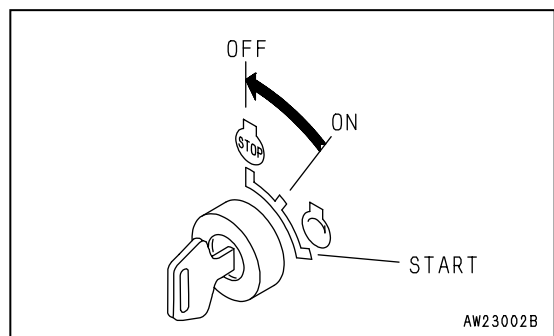
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency. In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.



1. Place fuel control lever(1) in the low idling position and run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



2. Place fuel control lever(1) in the engine stop position and stop the engine.
3. Turn the key in starting switch(2) to the OFF position and remove the key from starting switch(2).



CHECK AFTER STOPPING ENGINE

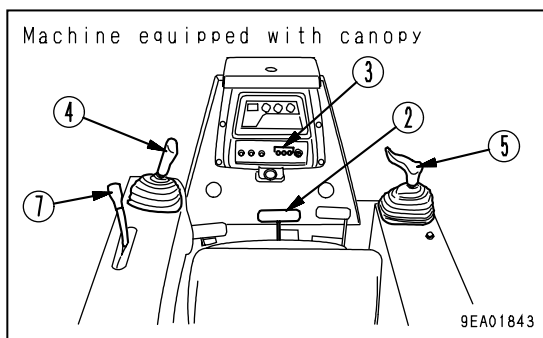
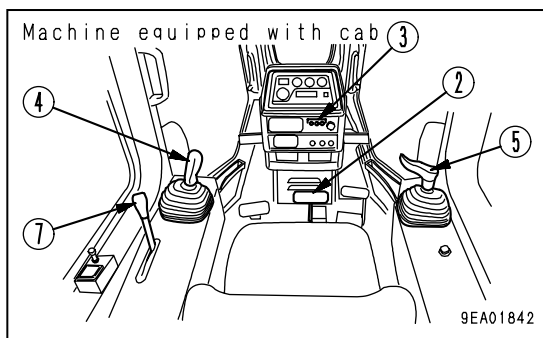
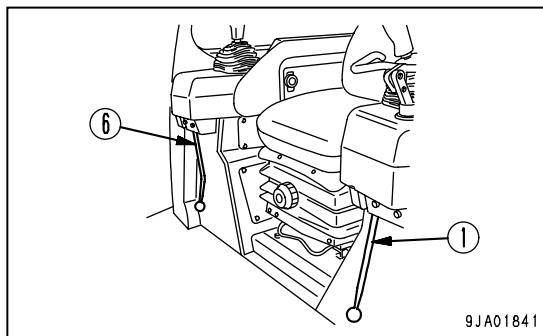
1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a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

MACHINE OPERATION

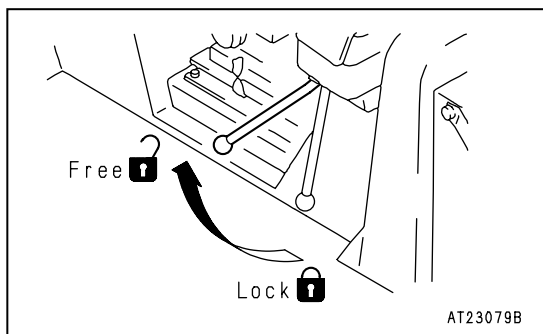
MOVING MACHINE OFF

WARNING

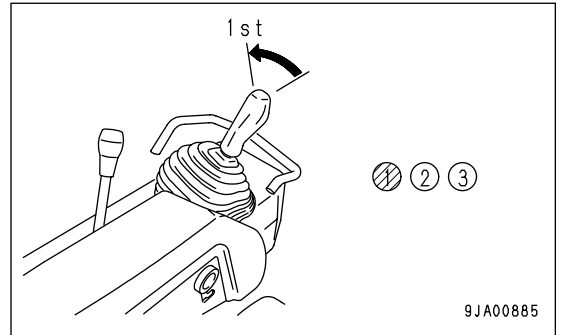
- When moving machine, check that the area around the machine is safe, and sound the horn before moving.
Clear all personnel from the machine and the area.
Clear all obstacles from the path of the machine.
Use extreme care when reversing the machine. Note there is a blind spot behind the machine.
- When starting the machine on an uphill ground, pull fuel control lever(7) to the end to run the engine at the highest speed, then set steering, directional and gear shift lever(4) to the 1st gear position with brake pedal(2) depressed. Set steering, directional and gear shift lever(4) in the starting direction and release brake pedal(2) slowly. After the machine starts slowly, release the brake pedal completely.
- For machines equipped with a backup alarm, check that the backup alarm sounds when steering, directional and gear shift lever(4) is placed in REVERSE.



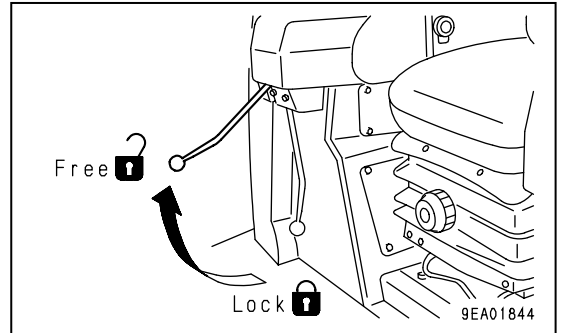
1. Set brake lock lever(1) to the FREE position.



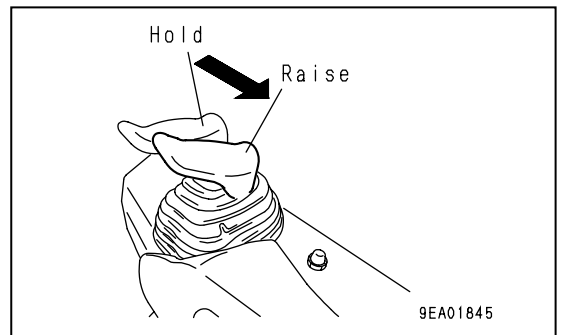
- Operate steering, directional and gear shift lever(4) to the desired position, and check that speed range display lamp(3) shows the correct position.



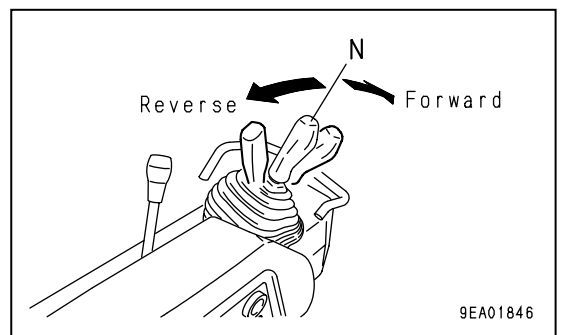
- Set safety lock lever(6) for blade control lever(5) to the FREE position.



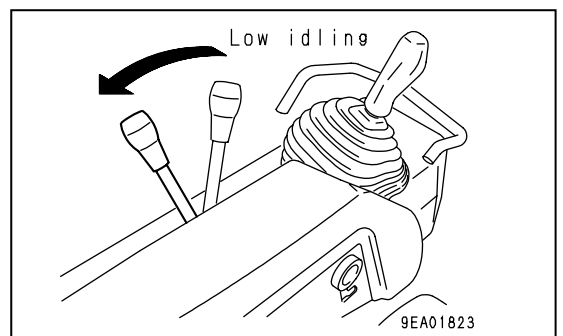
- Put blade control lever(5) in the RAISE position to raise the blade 40 to 50mm (1.6 to 2.0in) off the ground.



- Move steering, direction and gear shift lever(4) to the F (forward) or R (reverse) position to move the machine off.



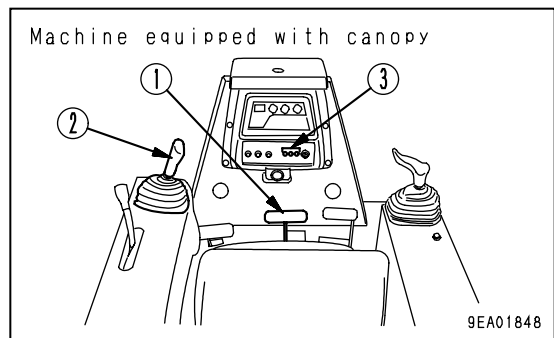
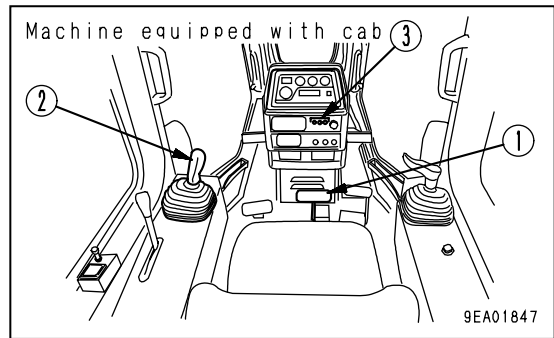
- Pull fuel control lever(7) to increase engine speed.



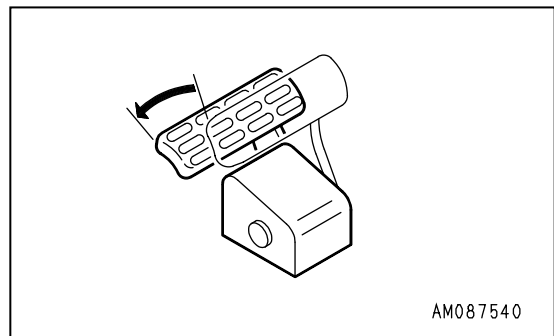
STOPPING MACHINE

WARNING

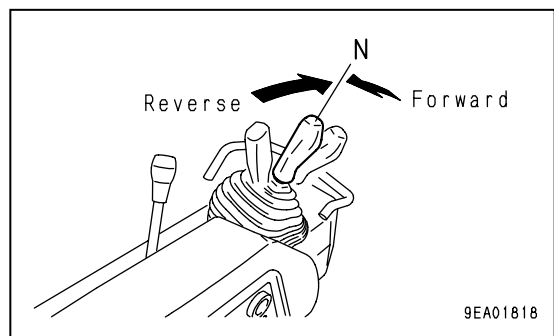
Avoid stopping suddenly. Give yourself ample room when stopping.



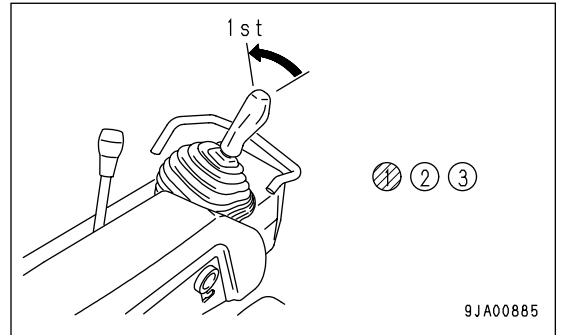
1. Depress brake pedal(1) to stop the machine.



2. Place steering, directional and gear shift lever(2) in the N (neutral) position.



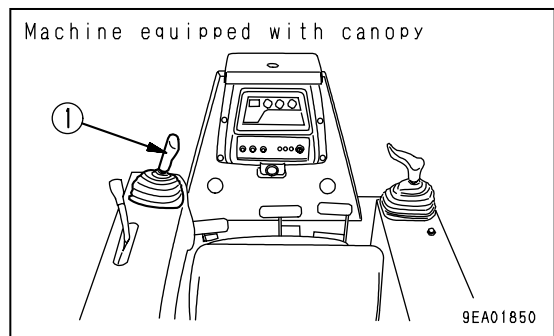
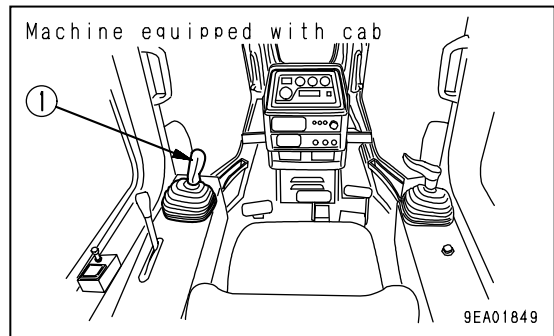
- 3. Operate steering, directional and gear shift lever(2) to 1st, and check that speed range display lamp(3) shows the correct position.



SHIFTING GEAR

There is no need to stop machine to shift gears.

Set steering, directional and gear shift lever(1) in the desired position to shift gear.

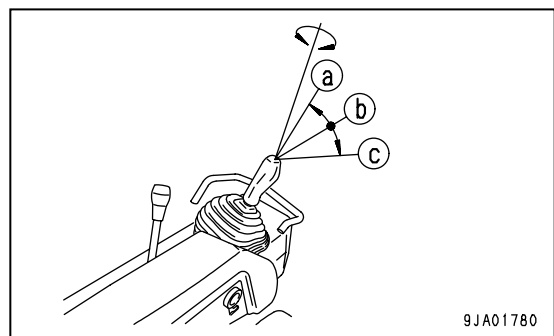


- Gear shifting

Rotate the joystick 30° to carry out gear shifting operation.

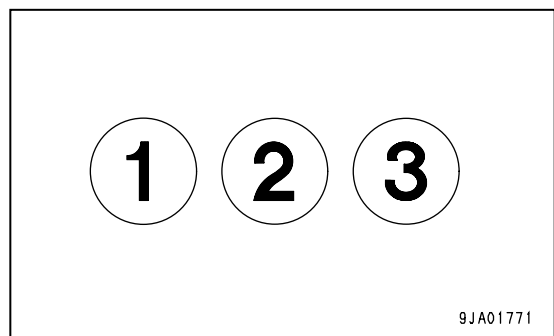
- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd

For the maximum travel speed in each gear speed, see "SPECIFICATIONS (PAGE 5-2)".



As the gear is shifted, one of the gear speed lamps on the front panel lights up.

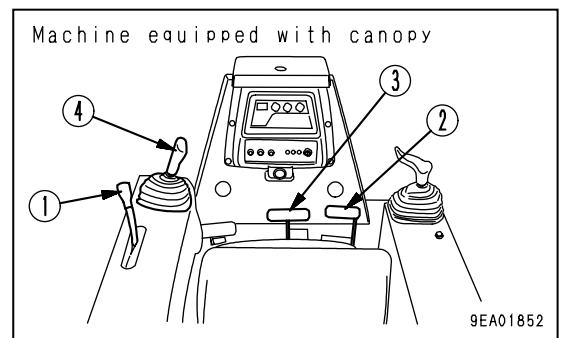
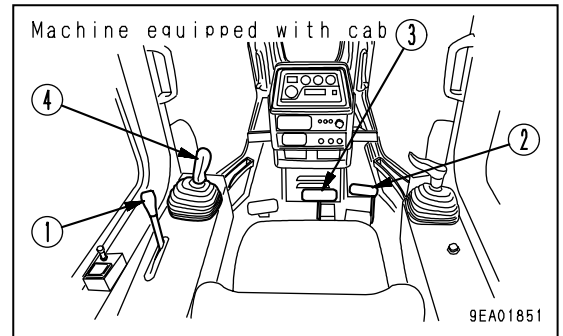
- 1st: Lamp 1 lights up.
- 2nd: Lamp 2 lights up.
- 3rd: Lamp 3 lights up.



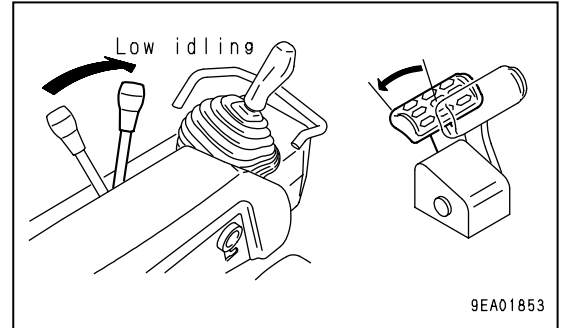
SHIFTING BETWEEN FORWARD AND REVERSE

⚠ CAUTION

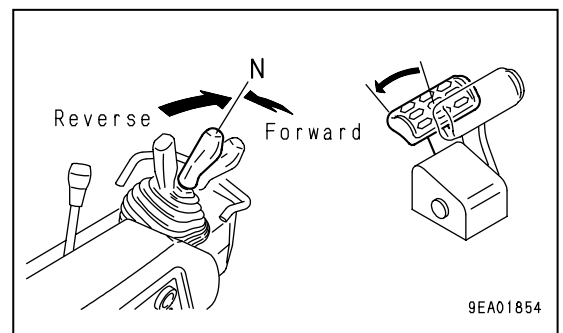
The travel direction can be changed without stopping the machine. Do not change it while the engine is running at the full speed, however, but depress the decelerator pedal to lower the engine speed before changing the travel direction for safety, comfort, and longer life of the power train.



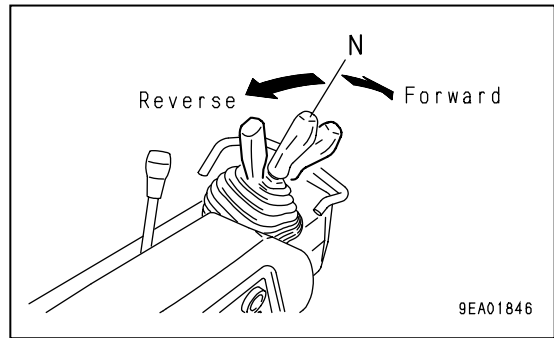
1. Set fuel control lever(1) to the LOW IDLING position or depress decelerator pedal(2) to reduce the engine speed.



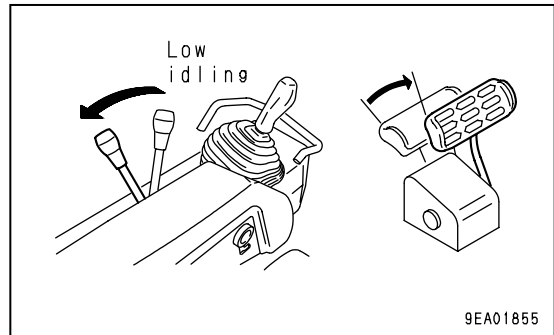
2. Depress brake pedal(3) to apply the brake.
3. Move steering, directional and gear shift lever(4) to the N (neutral) position, depress brake pedal(3) further, and stop the machine.



- 4. Shift steering, directional and gear shift lever(4) to the desired position.



- 5. Pull fuel control lever(1) or release decelerator pedal(2) to raise the engine speed.
- 6. For machines equipped with a backup alarm, check that the backup alarm sounds when steering, directional and gear shift lever(4) is placed in REVERSE. If the alarm does not sound, please contact your Komatsu distributor.



STEERING MACHINE

WARNING

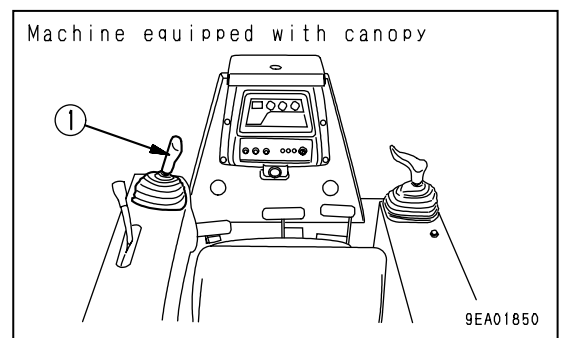
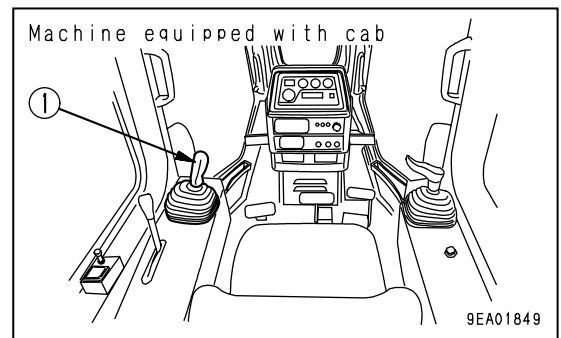
- Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.
- Never make a pivot turn at high speed.

NORMAL TURNING

WARNING

The feeling of the operation if the operator carries out a counterrotation turn when your head is facing the rear is different from the feeling when facing the front, so never carry out counterrotation turns when facing the rear.

To turn the machine while traveling, incline steering, directional and gear shift lever(1) in the direction to turn.



TURNING TO LEFT WHILE TRAVELING FORWARD

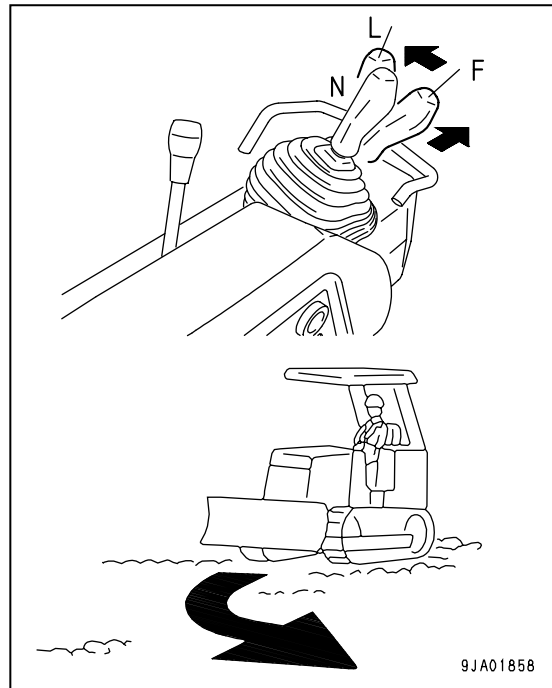
NOTICE

If the lever is operated partially to the forward or reverse position and then is operated 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 the steering, directional and gear shift lever(1) is pushed forward and moved partially to the left (L), the machine will start to turn gradually. After that, the lever can be moved further toward the end of its stroke to give the desired turning radius.

REMARK

If the steering, directional and gear shift lever(1) is pushed forward and moved partially to the right, the machine will start to turn gradually to the right. After that, the lever can be moved further toward the end of its stroke to give the desired turning radius. Do the same when traveling in reverse.



CARRYING OUT COUNTERROTATION TURN TO LEFT

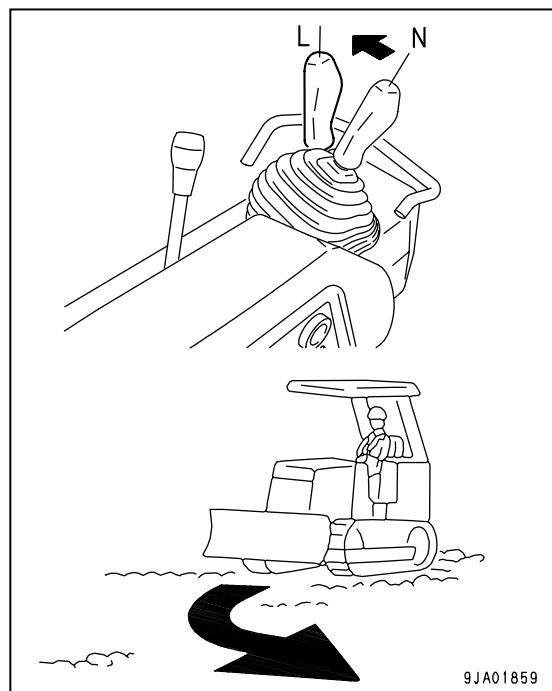
NOTICE

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, so check the ground conditions and be careful not to hit any obstacles.

If the steering, directional and gear shift lever(1) is placed at the N (neutral) position and is operated partially to the left, the left and right tracks will rotate in opposite directions and the machine will carry out a counterrotation turn smoothly. If the lever is operated fully, the speed of the counterrotation turn will increase.

REMARK

When carrying out a counterrotation turn to the right, move the steering, directional and gear shift lever(1) to the right in the same way.



TURNING WHILE DESCENDING A SLOPE

This machine (which can turn by counterrotation) does not cross-steer even when it descends a steep slope where it is driven down by its own weight or when it is pushed down by a towed machine on a slope. Accordingly, descend a slope as explained below.

NOTICE

Do not use the counterrotation turn on slopes.

The load on the left and right sides will not be uniform, and the machine may turn sharply to one side.

REMARK

Cross steering means the phenomenon that the machine turns in the opposite direction to the actual steering direction.

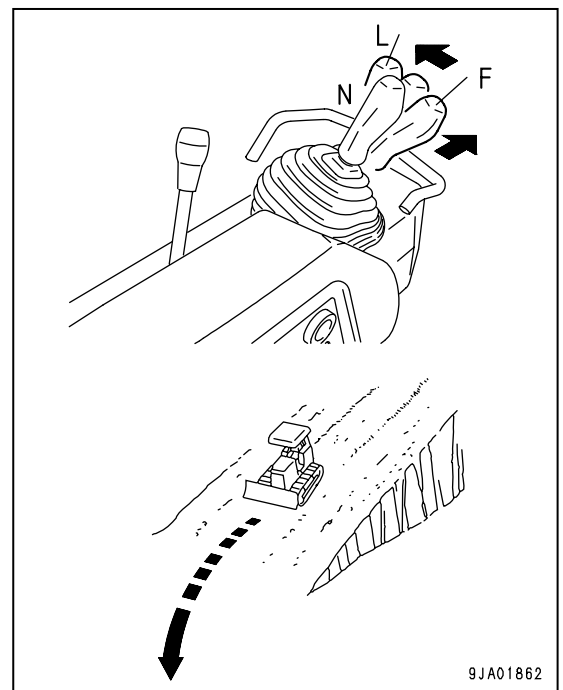
WHEN TURNING TO THE LEFT GRADUALLY WHILE TRAVELING FORWARD

If the steering, directional and gear shift lever(1) is pushed forward and moved partially to the left(L), the machine turns gradually to the left. (Does not become reverse steering)

REMARK

When making gradual turns to the right, push the steering, directional and gear shift lever(1) forward, and move it partially to the right. (Does not become reverse steering)

Do the same when traveling in reverse.

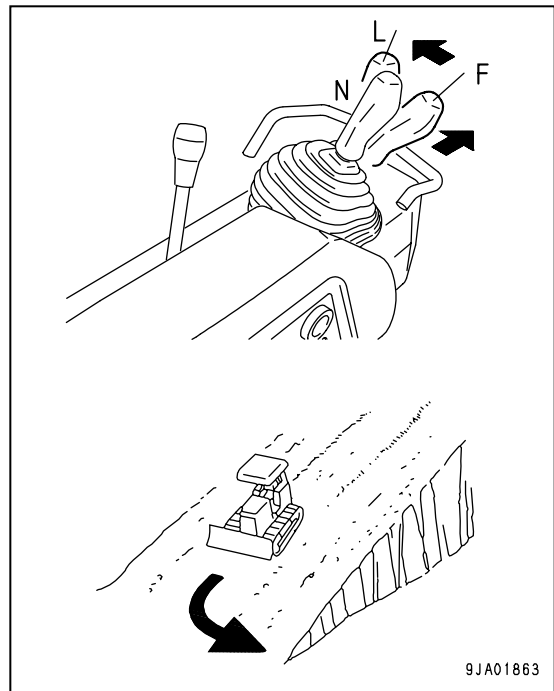


WHEN MAKING A PIVOT TURN TO THE LEFT WHILE TRAVELING

If the steering, directional and gear shift lever(1) is pushed forward and moved fully to the left(L), the machine turns sharply to the left. (Does not become reverse steering)

REMARK

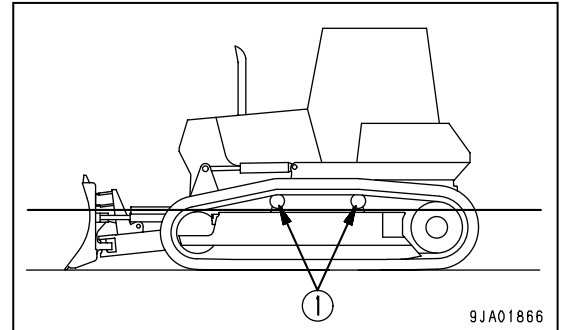
When making sharp turns to the right, push the steering, directional and gear shift lever(1) forward, and move it fully to the right. (Does not become reverse steering)
Do the same when traveling in reverse.



PRECAUTIONS FOR OPERATION

PERMISSIBLE WATER DEPTH

When operating in water, always keep the bottom of carrier roller(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.



PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

USE ENGINE AS BRAKE

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

Never coast down slope with the steering and directional lever in the N (neutral) position.

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, so be careful not to let the fuel level in the fuel tank become too low.

PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

If the engine stops while working or driving on a slope, the brake is applied automatically. Take care since the machine stops suddenly at this time.

IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS

(Machine 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 OBSTRUCT THE VIEW

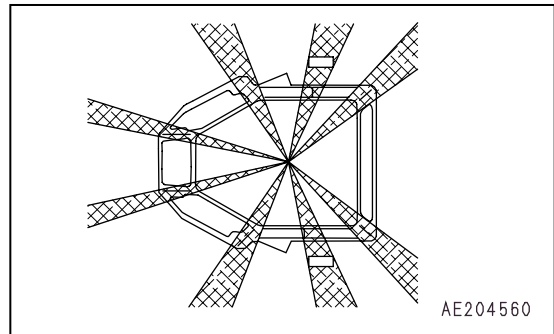
(Machine equipped with cab)

- 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 STAY

WARNING

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

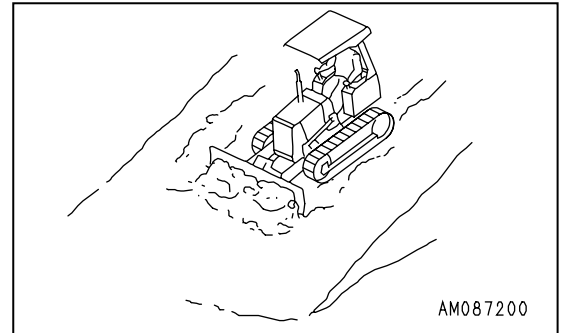


WORK POSSIBLE USING BULLDOZER

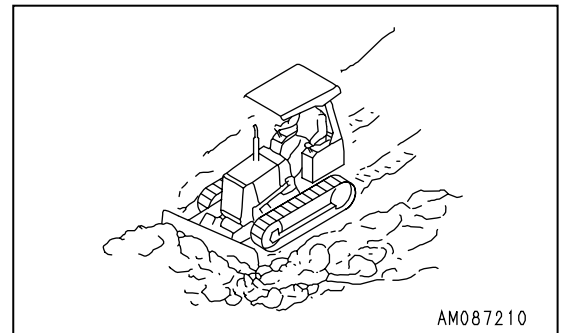
In addition to the following, it is possible to further increase the range of applications by using various attachments.

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).

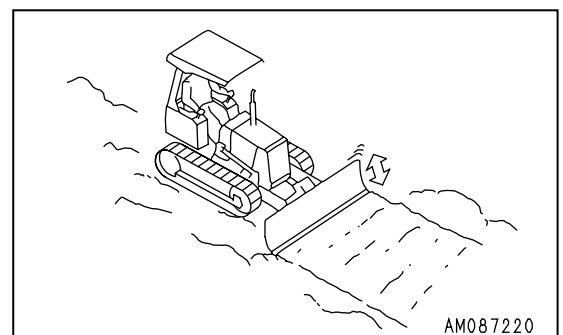


SMOOTHING

NOTICE

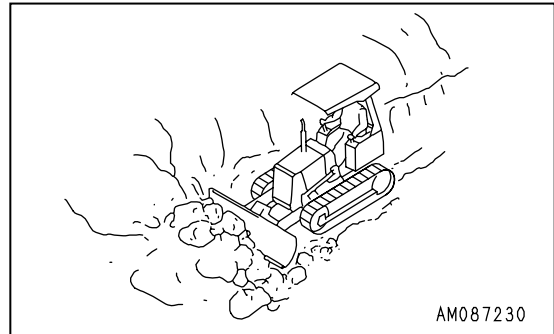
Avoid smoothing on rocky or stony ground. It can damage the blade.

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 up root trees or stumps or fell trees by angling or tilting the blade.

For trees with a diameter of 10 to 30cm (3.9 to 11.8in), 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.



ADJUSTING 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 apply the locks securely to the safety 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)

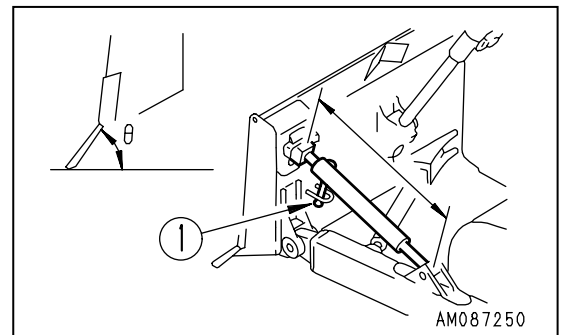
DECREASE distance (l) to DECREASE angle (θ).

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

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

D61EX: 960mm (37.8in)

D61PX: 960mm (37.8in)



ADJUST AMOUNT OF TILTPOWER 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 safety lock lever.

POWER TILTDOZER

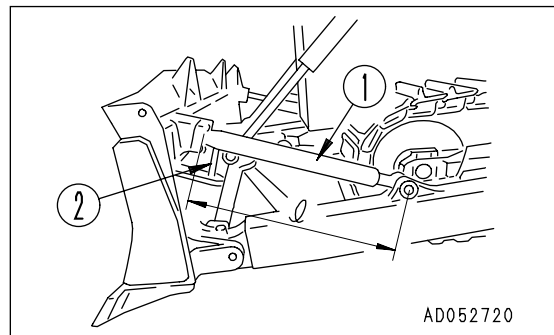
1. The following amount of tilt can be obtained by operating the blade control lever.

D61EX: 470mm (18.5in)

D61PX: 420mm (16.5in)

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 990mm (36.8 to 39.0in)
D61PX: 935 to 990mm (36.8 to 39.0in)
- Max. amount of tilt
D61EX: 690mm (27.2in)
D61PX: 600mm (23.6in)



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.

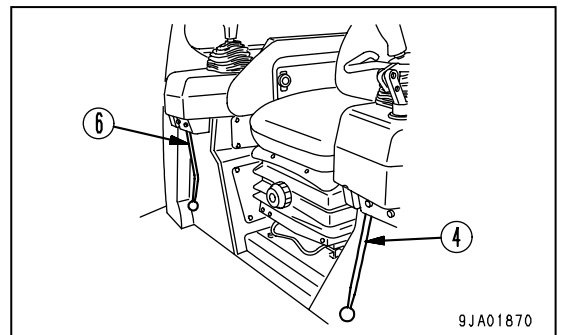
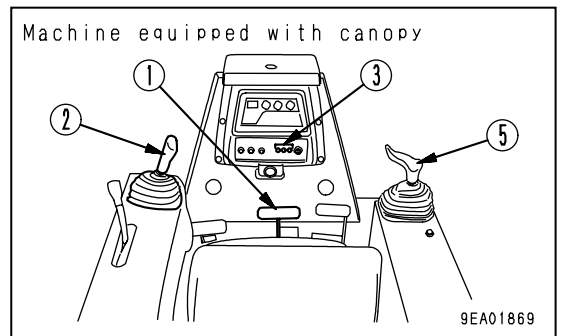
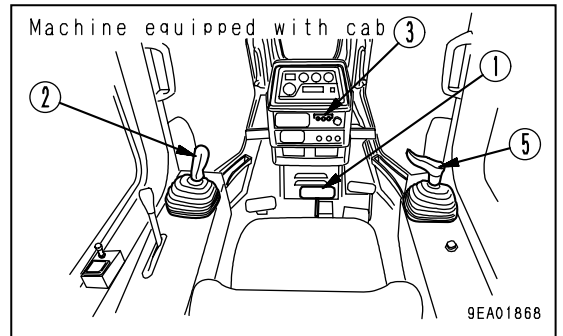
REMARK

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

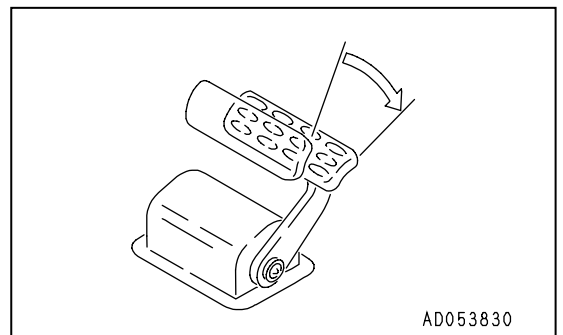
PARKING MACHINE

⚠ WARNING

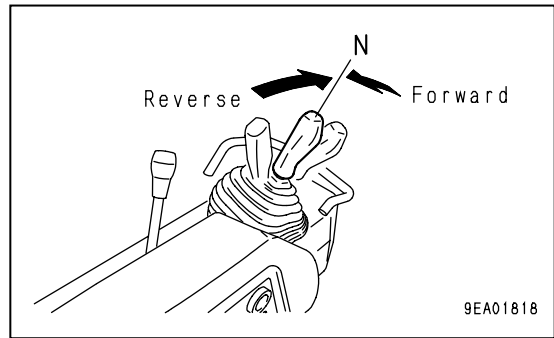
- Avoid stopping suddenly. Give yourself ample room when stopping.
- When stopping the machine, select flat hard ground and avoid dangerous places.
If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track shoes. 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 safety lever to place it securely at the LOCK position.



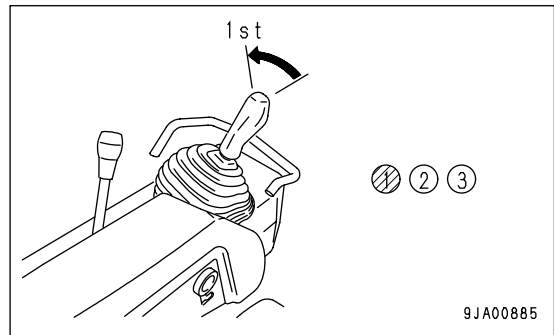
1. Depress brake pedal(1) to stop the machine.



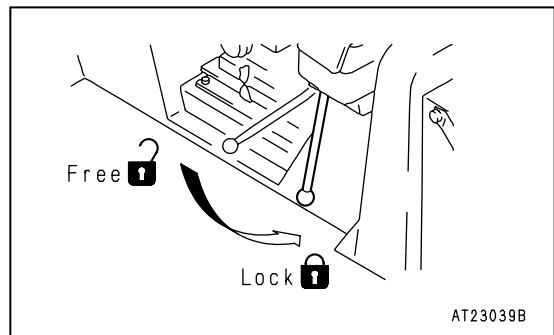
- 2. Place steering, directional and gear shift lever(2) in the N (neutral) position.



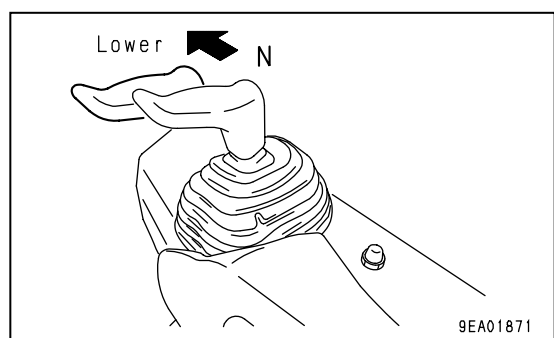
- 3. Operate joystick(2) to 1st, and check that speed range display lamp(3) shows the correct position.



- 4. Operate brake lock lever(4) to lock the brakes.

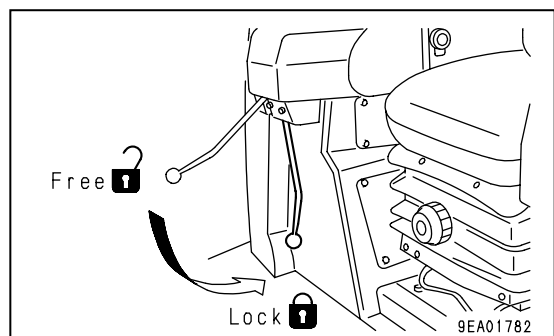


- 5. Operate blade control lever(5) to the LOWER position, and lower the blade to the ground.



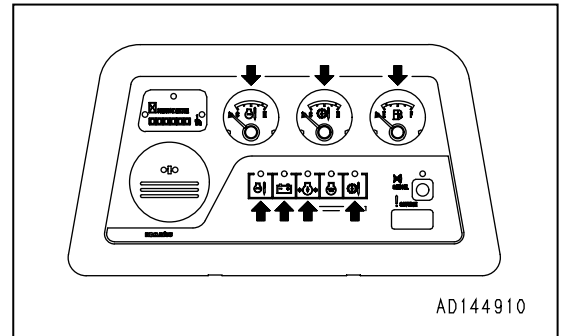
- 6. Operate blade control lever(5) to the HOLD position.

- 7. Lock blade control lever(5) with safety lock lever(6).



CHECK AFTER FINISHING WORK

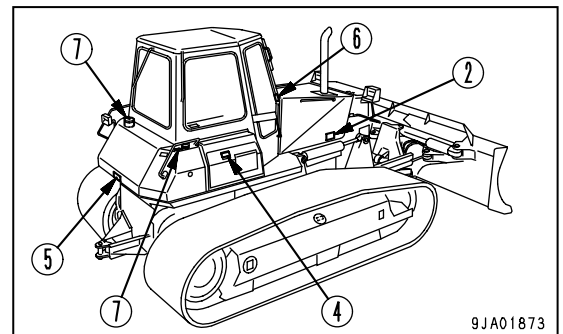
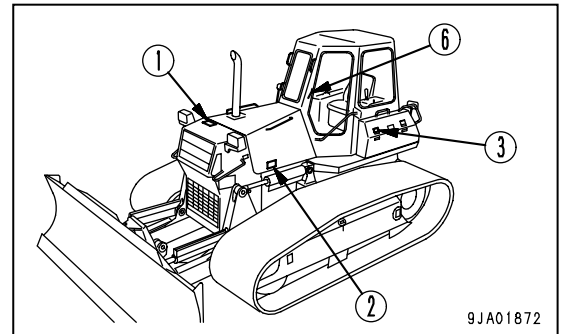
Use the meters and caution lamps to check the engine water temperature, engine oil pressure, fuel level, and transmission oil temperature.



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 cover(2)
- Battery inspection cover(3)
- Filter inspection cover(4)
- Inspection cover for fuel tank drain valve(5)
- Cab door opener(5) (machines equipped with cab)
- Cap with lock(7)
 - Fuel tank cap
 - Hydraulic oil tank cap



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

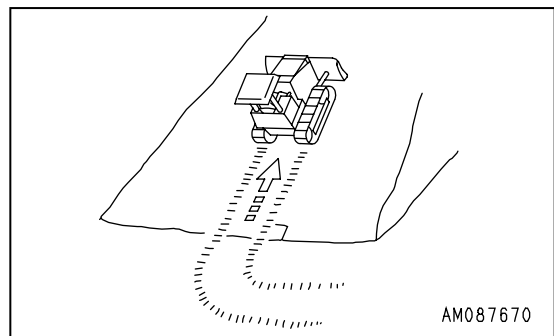
- Select the track shoe that best suits the type of soil to be encountered in service.

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, unnecessarily 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 left or right during digging operation, do not continue to dig with machine inclined. Move 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.



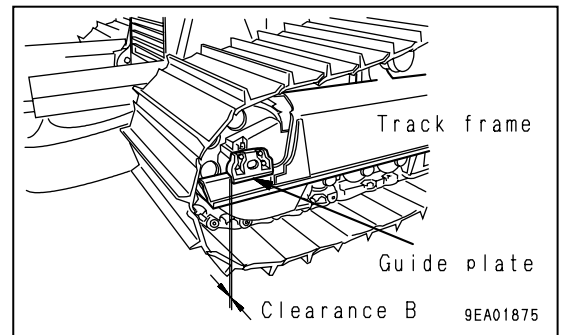
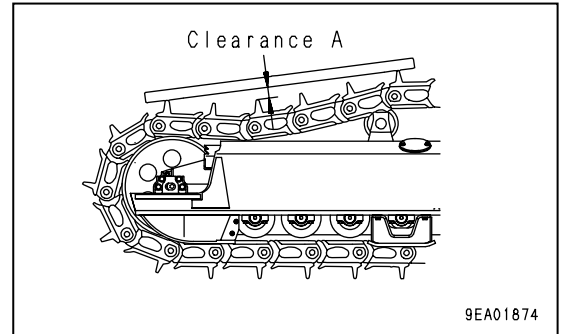
INSPECTION AND ADJUSTMENT

- Properly adjust track tension.

Check the track tension by measuring clearance A between the idler and carrier roller shown in the figure at right. Clearance A should be 20 to 30mm (0.8 to 1.2in) normally. Tense the track a little more for operation on rocky terrain and loosen it a little for operation on clayey terrain. Carrying out operations when the track is excessively loose may cause abnormal vibration and abnormal wear of the sprocket teeth.

(For inspection and adjustment procedures, refer to "CHECK TRACK TENSION (PAGE 4-25)").

- Check idler rollers for oil leakage as well as for loose bolts and nuts. If any trouble is detected, repair immediately.
- Check clearance B between the idler guide plate and track frame. If clearance B increases, idler may move sideways and the tracks may come off. (For inspection and adjustment procedure, refer to "ADJUST IDLER CLEARANCE (PAGE 4-30)").



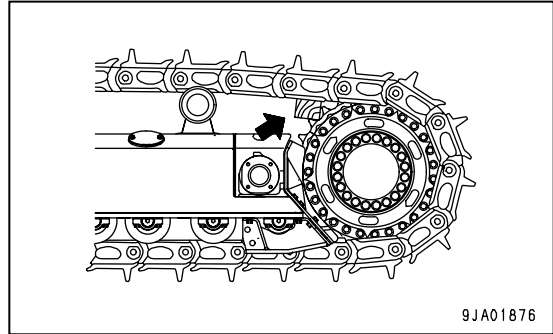
INSPECTION AND REPAIR

Frequent inspection and prompt repair will reduce repair costs.

The following items for inspection will serve as a guide to maintenance service of each undercarriage part. Perform periodical inspection and contact the Komatsu distributor in your area when machine has approached repairable limits and reversing limits.

MEASURING LINK PITCH

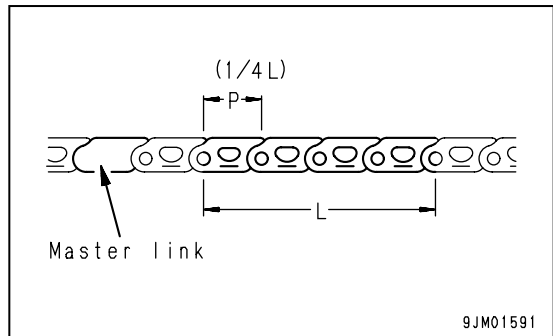
1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.



2. Measure pitch length of 4 links in stretched portion at more than 2 links away from master pin. Of length obtained, 1/4 is the link pitch.

- Basic link pitch (P): 190mm (7.5in)
- Link pitch limit for turning: 193mm (7.6in)

There is no link window on the master link.



REMARK

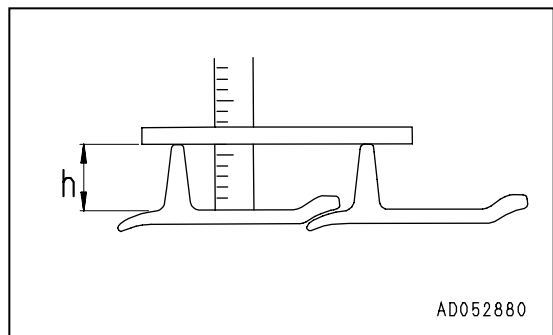
The measured value after the decimal point for the link pitch may be different from basic link pitch (P), even if there is no wear. This depends on the tolerance for the machining dimensions and the precision of measurement. Do not immediately judge that there is wear; take measurements periodically and judge from the trend.

MEASURING HEIGHT OF GROUSER

(D61EX)

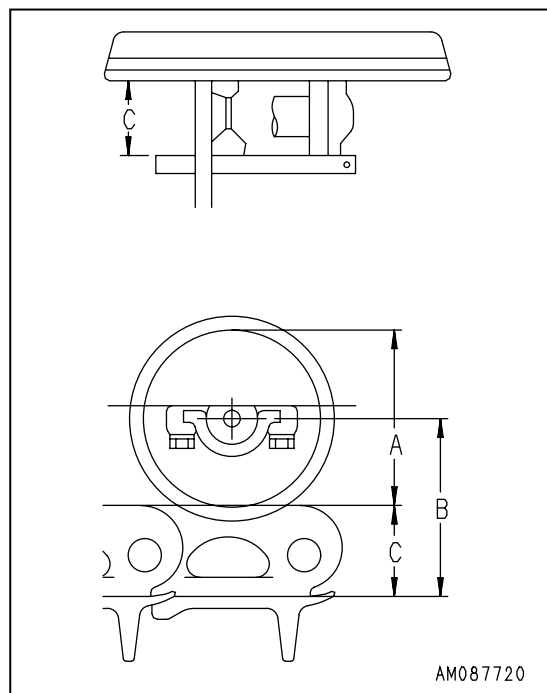
After taking up slack in track shoes, measure height at center of shoe as shown below.

- Standard height (h): 55.5mm (2.2in)
- Repair limits: 16.5mm (0.7in)



MEASURING OUTSIDE DIAMETER OF TRACK ROLLER

1. Measure height (size C) of link tread as shown.
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):
 $A = (B - C) \times 2$
 - Standard size (A): 200mm (7.9in)
 - Repair limits: 164mm (6.5in)



TRANSPORTATION

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

TRANSPORTATION PROCEDURE

Transport the machine on a trailer, as a rule.

Select a trailer according to the mass and dimensions of the machine shown in "SPECIFICATIONS (PAGE 5-2)". Note that the mass and dimensions for transportation shown in SPECIFICATIONS depend on the types of the shoe, blade, etc.

PRECAUTIONS WHEN REMOVING WORK EQUIPMENT

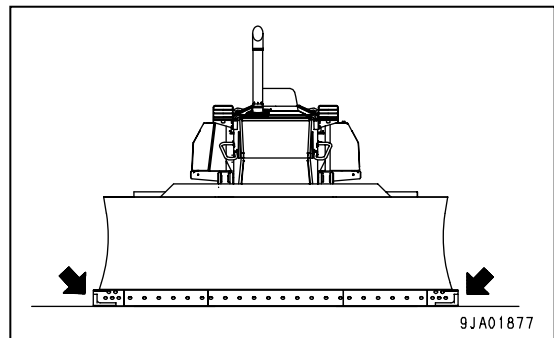
POWER ANGLE, POWER TILTDOZER

(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 3.0m (9ft 10in). Accordingly, the blade of D61EX does not need to be removed.



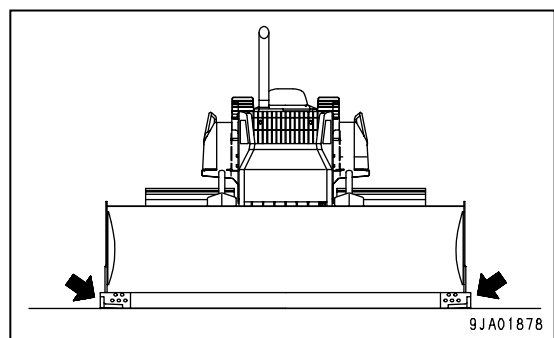
POWER TILTDOZER

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.

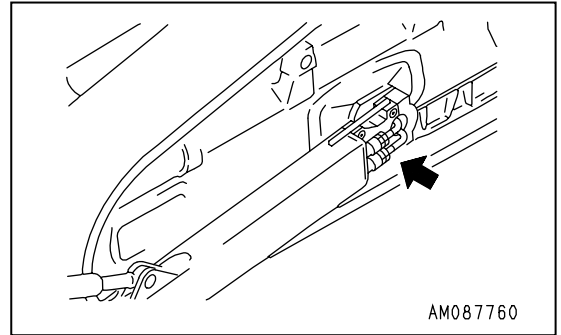
1. Lower the blade to the ground and set it horizontal to the ground surface.

REMARK

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



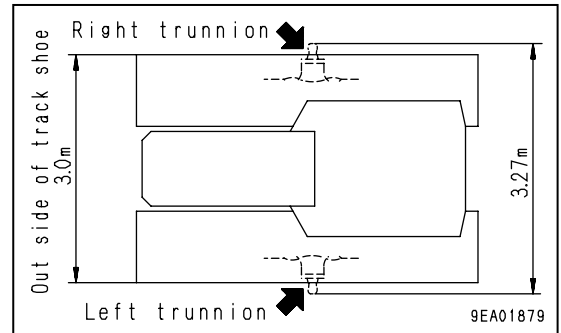
- Remove the quick coupler, then remove the work equipment assembly.



- Remove the left and right trunnions.
(For D61PX)

REMARK

- In the case of D61PX, remove the left and right trunnions.
 - In the case of D61EX, the width including the left and right trunnions is within 3.0m (9ft 10in), so there is no need to remove them.
- Tie the tilt hose with a band to prevent it from being damaged.



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.

LOADING, UNLOADING WORK

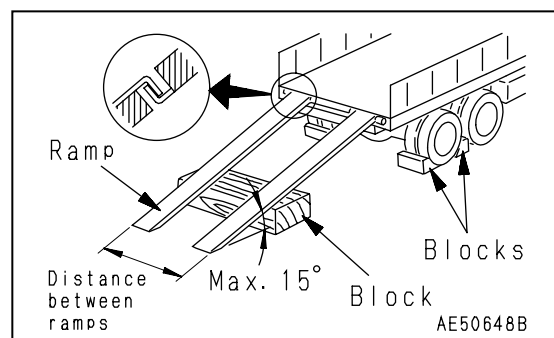
⚠ WARNING

- Since loading and unloading work of the machine is dangerous, take care extremely.
- 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 largely, reinforce them with blocks.
- Perform the loading work of the machine on a level and hard place. 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 rolling of the machine. 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 boarder slowly.

When loading or unloading, always use ramps or a platform and carry out the operation as follows.

LOADING

1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move. Then fix the ramps in line with the centers of the trailer and the machine. Be sure that the two sides are at the same level as one another. Make the slope of the ramps a maximum of 15°. Set the distance between the ramps to match the center of the tracks.
3. Set the transmission in the 1st gear and run the engine at low idling speed.
4. Set the travel direction toward the ramps and drive slowly.
5. 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 boarder slowly.
6. Stop the machine at the specified position on the trailer.



SECURING MACHINE

WARNING

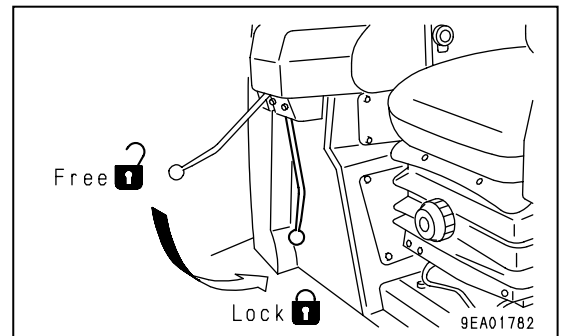
When the edge of the blade protrudes beyond the trailer, angle the blade.

NOTICE

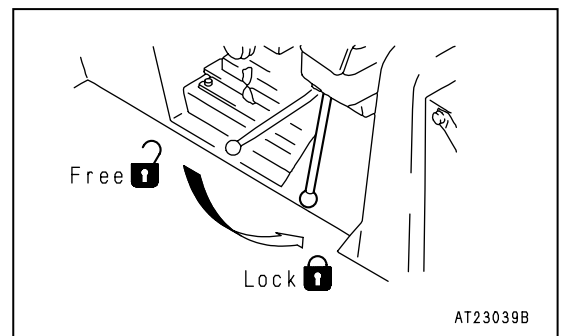
Be sure to retract the car radio antenna (if the machine equipped with cab).

Load the machine on to a trailer as follows.

1. Lower the work equipment slowly.
2. Lock brade control levers securely with the safety lock lever.

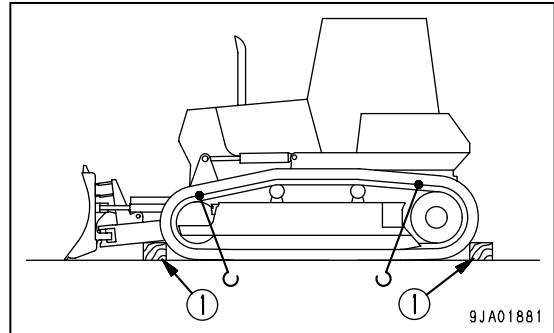
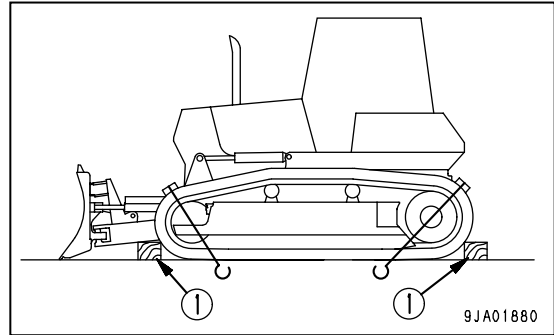


3. Set the brake lock lever to the LOCK position.



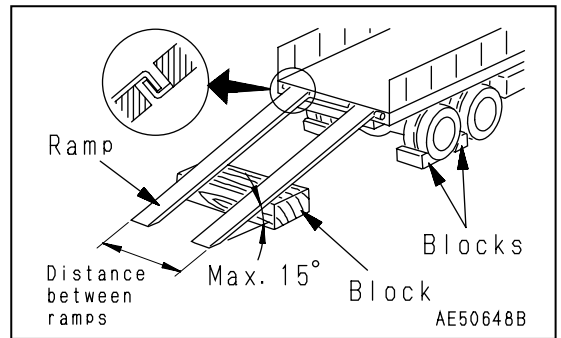
4. Turn the starting switch to the OFF position to stop the engine, and pull out the starting switch key.
5. Fix the machine as explained below so that it will not move during transportation. In particular, fix the machine securely to prevent it from slipping sideways.

- 1) Put blocks in front and behind the track shoes of both sides.
- 2) Set up chain or wire, following (A) or (B).
 - A: Set up chain or wire through the holes of track links.
 - B: Set up chain or wire around the track shoes.
- 3) Protect the wire from contacting directly with angular parts of the machine, by inserting pads.

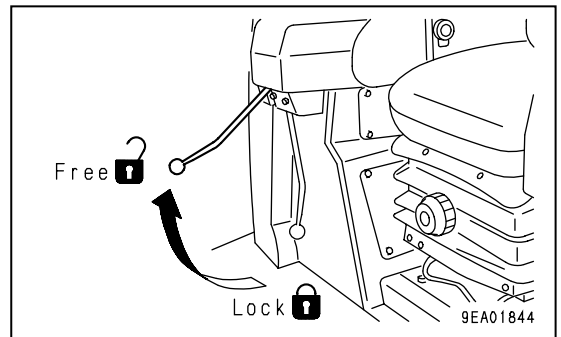


UNLOADING

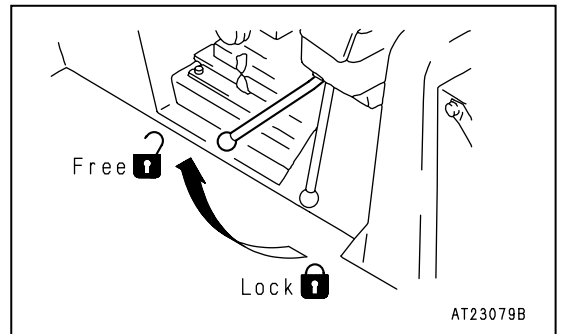
- 1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
- 2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move. Then fix the ramps in line with the centers of the trailer and the machine.
Be sure that the two sides are at the same level as one another. Make the slope of the ramps a maximum of 15°. Set the distance between the ramps to match the center of the tracks.



- 3. Remove the chains or wire rope holding the machine.
- 4. Start the engine.
Warm the engine up fully.
- 5. Set the safety lock lever to the FREE position.



- 6. Set the brake lock lever to the FREE position.
- 7. Set the transmission in the 1st gear and run the engine at low idling speed.
- 8. Raise the blade.
- 9. Set the travel direction toward the ramps and drive slowly.
- 10. 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 boarder slowly.



- 11. 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 this machine.
- Lift the machine in only the position shown below. If it is lifted in another position, it may be unbalanced.
- Lift the machine horizontally.

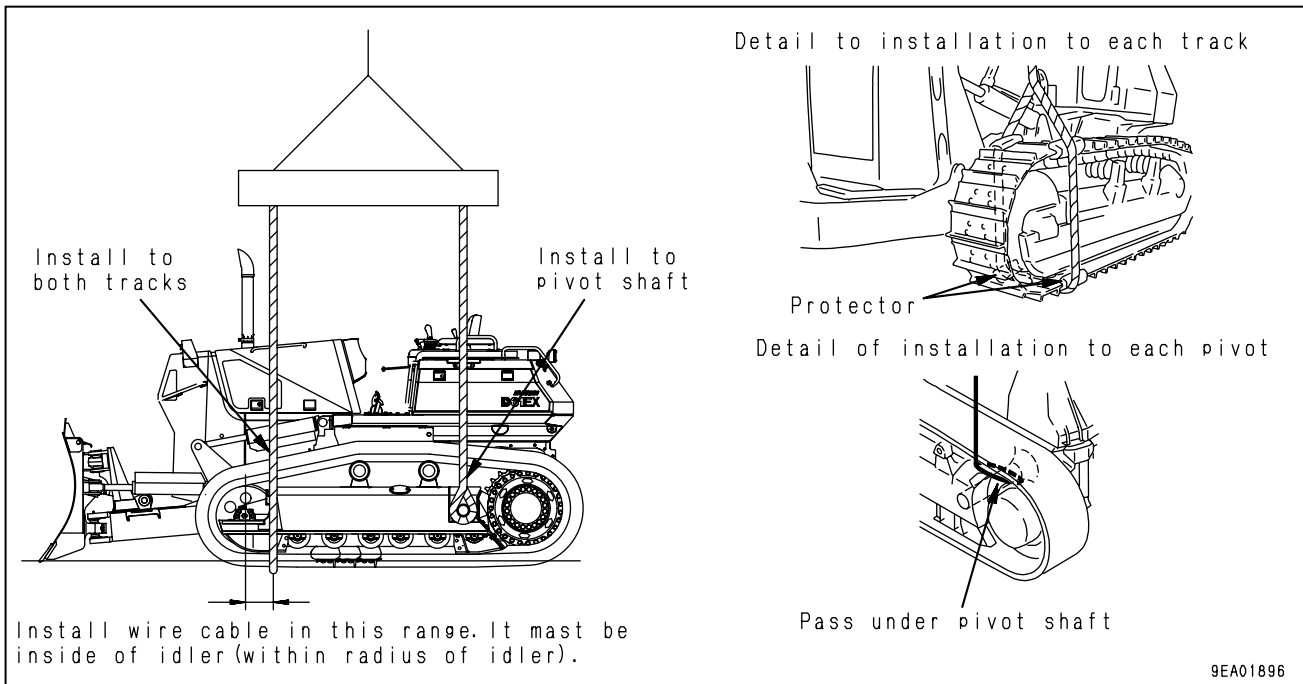
NOTICE

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

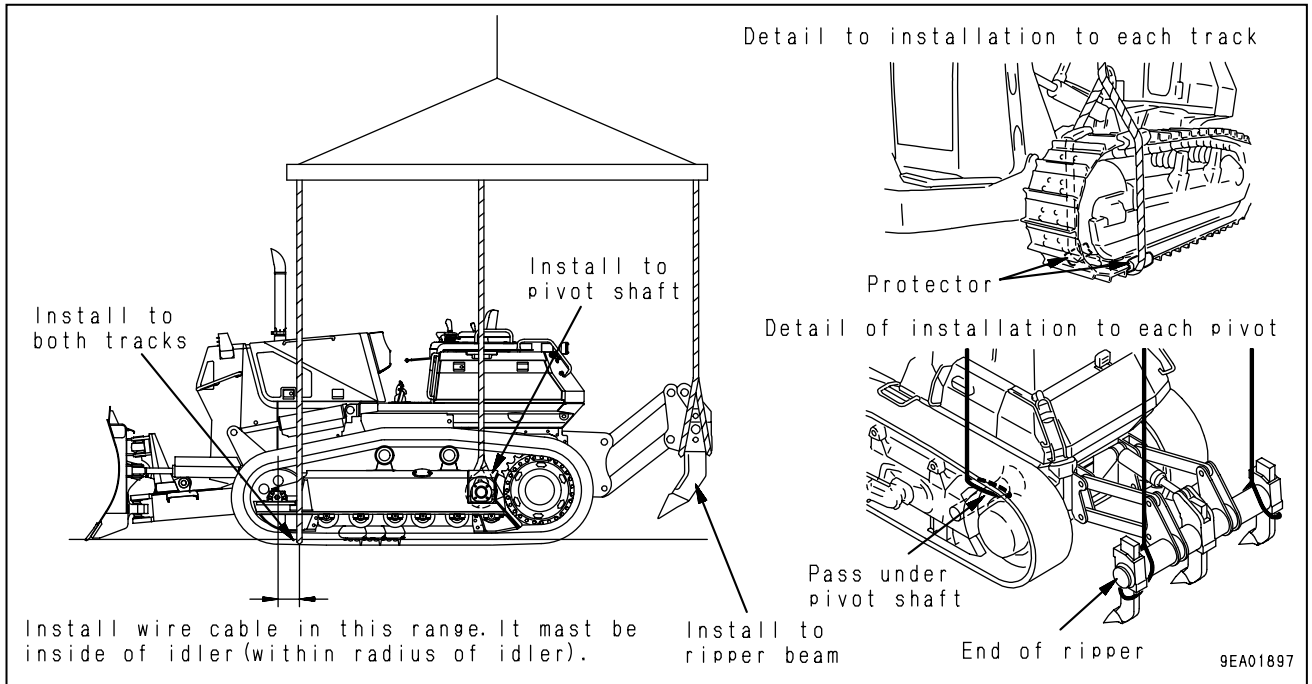
For details of the weight, see "SPECIFICATIONS (PAGE 5-2)".

PROSEDURE FOR LIFTING OPERATIONS

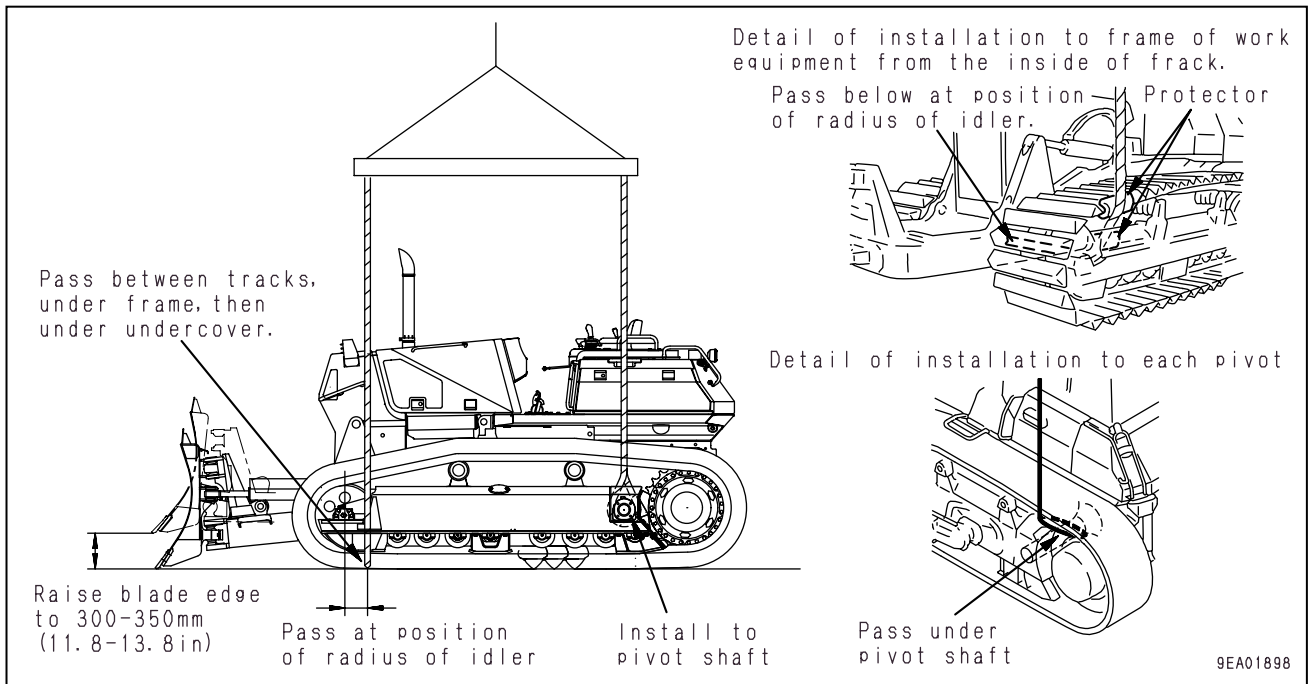
(For D61EX)



For machine equipped with ripper

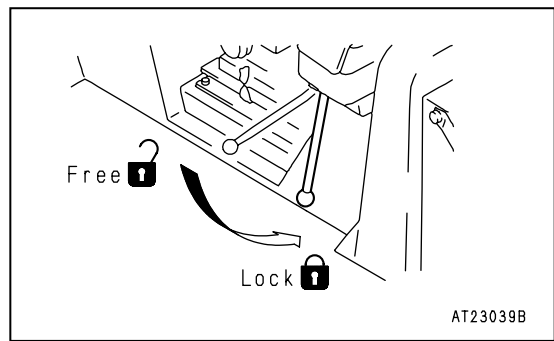


(For D61PX)



When lifting the machine, stop it on a level place, then observe the following procedure.

1. Stop the engine and set the brake lock lever to the LOCK position.
2. Install wire ropes, slings, etc. matched to the weight of the machine to the lifting points as shown in the above figure.



NOTICE

- Use protectors, etc. so that the wire ropes will not be broken at sharp edges or narrow places.
 - Use sleds 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 200mm (3.9 to 7.9in) above the ground, and check that the wire ropes are not slack and the machine is horizontal, then lift up slowly.

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 to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 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 quantities of fresh water and see a doctor at once.
- Antifreeze is toxic. Be extremely careful when handling it. When replacing coolant containing antifreeze or when handling coolant when repairing the radiator, contact your Komatsu distributor or ask your local antifreeze dealer. Be careful not to let the water flow into drainage ditches or spray on to the ground surface.
- Antifreeze is flammable, so do not bring any flame close. Do not smoke when handling antifreeze.

NOTICE

Never use methanol, ethanol, or propanol-based antifreeze.

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 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

BATTERY

WARNING

- The battery generates flammable gas, 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 large amounts of water, and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on to 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.

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%, and insulate it against cold temperature so that 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.

Temp. of fluid	20°C (68°F)	0°C (32°F)	-10°C (14°F)	-20°C (-4°F)
Rate of charge				
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 drops markedly in low temperatures, cover the battery or remove it from the machine, keep it 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 the water after the day's work so as to prevent fluid in the battery from freezing in the night.

AFTER COMPLETION OF WORK

WARNING

- Performing idle-running of the tracks is dangerous, so stay well away from the tracks.
- After completion of operations, fill the fuel tank to prevent the formation of water caused by condensation of moisture in the empty space in the tank when the temperature goes down.

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

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen 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 soil and the machine can start next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it 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. To prevent the battery electrolyte from freezing in the night, do not add water after the day's work.

AFTER COLD WEATHER

When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.

For details, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-10)".

- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh soft water.

LONG-TERM STORAGE

BEFORE STORAGE

When putting the machine in storage for more than one month, do as follows.

- After every part is washed and dried, the machine shall be housed in a dry building. Never leave it outdoors. In case it is indispensable to leave it outdoors, park the machine on the flat ground and cover it with canvas etc.
- 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.
- If the ambient temperature is expected to drop below 0°C, always add antifreeze to the cooling water.
- Place all control levers at the neutral position, operate the safety lever and parking lever to the LOCK position, then move the fuel control dial to the low idling position.

DURING STORAGE

WARNING

If it is unavoidably necessary to carry out the rust-preventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

Operate the engine and move the machine for a short distance once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.

- For machines equipped with an air conditioner, run the air conditioner.
- Rotate the tracks.

AFTER STORAGE

NOTICE

If the machine is to be used when the monthly rust prevention operation has not been carried out, please contact your Komatsu distributor.

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

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

STARTING MACHINE AFTER LONG-TERM STORAGE

When starting the engine after long-term storage, cancel the automatic warming-up operation as follows.

1. Turn the starting switch key to the ON position.
2. Pull the fuel control lever from the LOW idling position to the FULL position, and hold it there for at least 3 seconds, then return it to the LOW idling position and start the engine.

TROUBLESHOOTING

AFTER RUNNING OUT OF FUEL

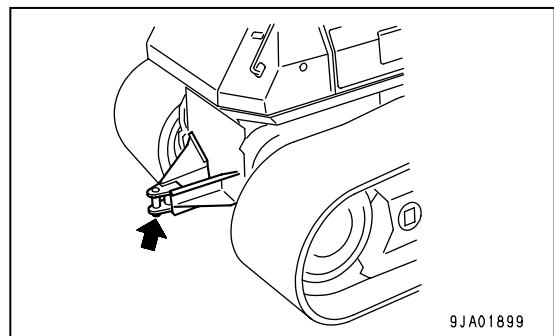
When starting after running out of fuel, fill with fuel and bleed the air from the fuel system before starting. For details of bleeding the air, see "REPLACE FUEL FILTER CARTRIDGE (PAGE 4-49)".

TOWING THE MACHINE

WARNING

- 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.

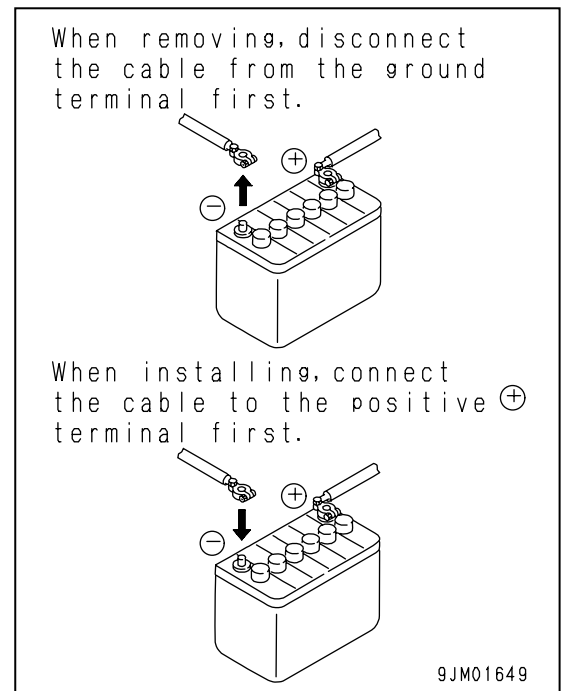
If the machine gets stuck in the mud or a heavy thing needs to be towed, install a towing wire rope to the draw bar pin.



IF BATTERY IS DISCHARGED

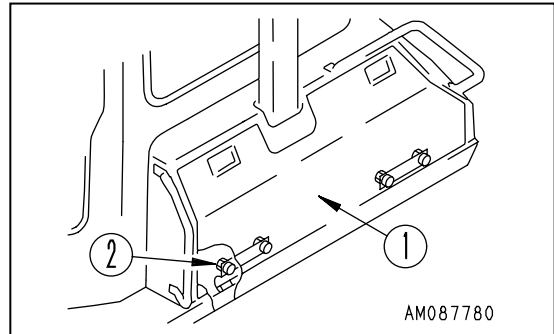
⚠ WARNING

- 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 sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts 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 installing the terminals, install them tightly. When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.
- Green rust around the terminals is a cause of self-discharge of the battery. Polish the terminals with sandpaper. After removing the rust, coat the terminals thinly with grease before installing.



REMOVE AND INSTALL BATTERY

1. Open battery cover(1), remove 4 bolts(2) on the inside, then remove cover(1).
2. Before removing battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the of the terminal and remove the wires from the battery.
3. After installing the battery, fix it with the battery fitting securely.



Tightening torque: 58.8 to 73.5N•m
(6.0 to 7.5kgf•m, 43.4 to 54.2lbft)

4. When install the battery, connect the ground cable last. Insert the hole of the terminal on the battery and tighten the nut.

Tightening torque: 5.88 to 9.81N•m (0.6 to 1.0kgf•m, 4.3 to 7.2lbft)

5. Install battery cover(1).

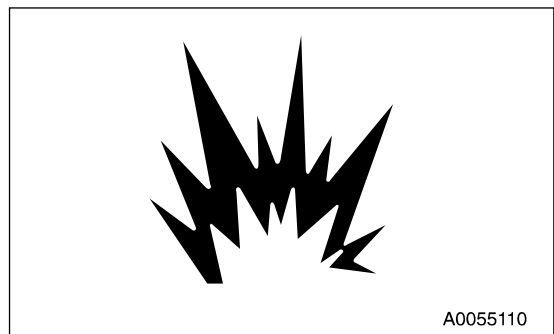
PRECAUTIONS FOR CHARGING BATTERY

If the battery is charged improperly, it may explode. Accordingly, charge it according to "IF BATTERY IS DISCHARGED (PAGE 3-103)" 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 voltage is not selected correctly, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to 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 hazard 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. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.



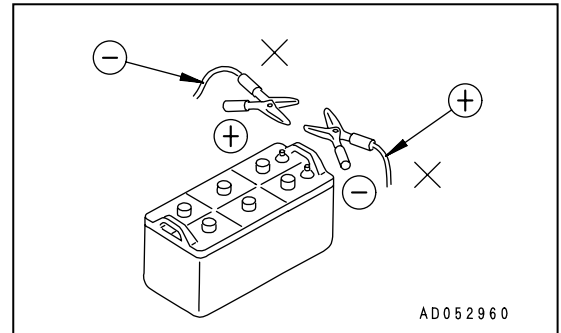
STARTING ENGINE WITH BOOSTER CABLE

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, always wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistaken 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

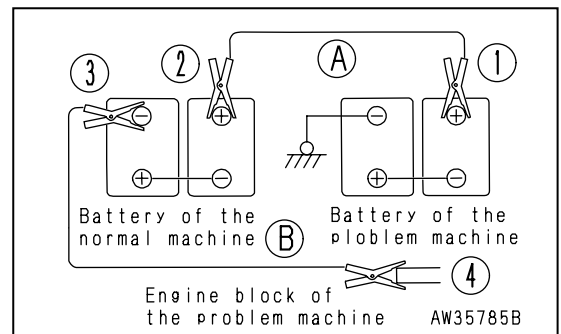
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the safety lock levers and brake lock levers of both machines are in the LOCK positions respectively.
- Check that each lever is in the neutral position.

CONNECTING THE BOOSTER CABLE

Connect the booster cable as follows, in the order of the numbers marked in the diagram.

Keep the starting switch at the OFF position.

1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable(A) to the positive (+) terminal of the problem machine.
3. Connect the other clip of booster cable(A) to the positive (+) terminal of the normal machine.
4. Connect one clip of booster cable(B) to the negative (-) terminal of the normal machine.
5. Connect the other clip of booster cable(B) to the engine block of the problem machine.



STARTING ENGINE

⚠ CAUTION

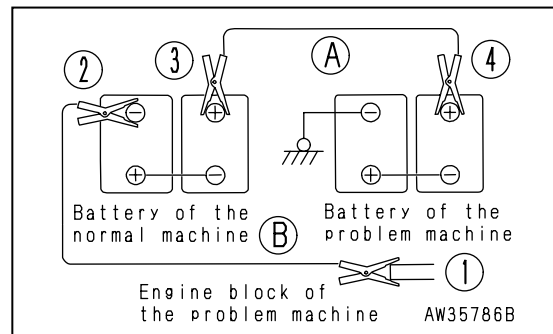
Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are at the HOLD or neutral position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the 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 the booster cables in the reverse of the order in which they were connected.

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



OTHER TROUBLE

ELECTRICAL SYSTEM

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	● Defective wiring	(● Check, repair loose terminals, disconnections)
Lamp flickers while engine is running	● Defective adjustment of fan belt tension	● Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Charge lamp does not go out even when engine is running	● Defective alternator ● Defective wiring	(● Replace) (● Check, repair)
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 ● Safety switch out of adjust	(● Check, repair) ● Charge (● Adjust safety switch)
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
Automatic preheating is not actuated	● Defective wiring ● Defective glow switch ● Defective timer	(● Check, repair) (● Replace) (● Replace)
Glow signal lamp dose not go out	● Defective wiring ● Defective heater relay	(● Check, repair) (● Replace)
Oil pressure caution lamp does not light up when engine is stopped (starting switch at ON position)	● Defective caution lamp ● Defective caution lamp switch ● Defective wiring	(● Replace) (● Replace) (● Check, repair)
Charge lamp does not light up when engine is stopped (starting switch at ON position)	● Defective charge lamp ● Defective wiring	(● Replace) (● Check, repair)
Outside of electrical intake air heater is not warm when touched by hand	● Defective wiring ● Disconnection in electrical intake air heater ● Defective operation of heater relay switch	(● Check, repair) (● Replace) (● Check,repair heater relay switch)
Air conditioner does not work properly	● Blown fuse ● Insufficient battery charge ● Defective air conditioner swtich ● Defective blower switch ● Defective compressor	(● Check, repair) ● Charge (● Replace air conditioner switch) (● Replace blower switch) (● Replace)
Speed range display lamp does not light up.	● Defective wiring ● Defective limit switch ● Defective display lamp	(● Check, repair) (● Replace) (● Replace)
Speed range display lamp does not change when gear is shifted.	● Defective wiring ● Defective limit switch	(● Check, repair) (● Replace)

CHASSIS

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
When brake pedal is depress, machine does not stop	<ul style="list-style-type: none"> ● Brake out of adjust, defective brake oil pressure 	(● Adjust, check, repair)
Track comes off	<ul style="list-style-type: none"> ● Track too loose 	<ul style="list-style-type: none"> ● Adjust track tension, see WHEN REQUIRED
Abnormal wear of sprocket	<ul style="list-style-type: none"> ● Track too loose or too tightened 	
Blade, rises slowly, dose not rise	<ul style="list-style-type: none"> ● Lack of hydraulic oil ● Safety lock lever in LOCK position 	<ul style="list-style-type: none"> ● Add oil to specified level, see EVERY 250 HOURS SERVICE ● Set lever in free position
Dose not steer even when steering or operated	<ul style="list-style-type: none"> ● Brake lock lever in LOCK position ● Defective hydraulic pressure at steering clutch 	<ul style="list-style-type: none"> ● Set lever in free position (● Check, repair)
Noise is generated from idler	<ul style="list-style-type: none"> ● Lack of oil in idler 	<ul style="list-style-type: none"> ● Add oil to specified level, see WHEN REQUIRED
Transmission oil pressure dose not rise	<ul style="list-style-type: none"> ● Wear, scuffing of gear pump ● Lack of oil in power train case ● Element strainer of oil filter in power train case clogged 	(● Check, repair) <ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● Clean For details, see EVERY 1000 HOURS SERVICE
Lacks drawber pull (cannot travel at full speed)	<ul style="list-style-type: none"> ● Lack of drive power from engine 	<ul style="list-style-type: none"> ● See ENGINE RELATED PARTS
Travel speed does not rise quickly	<ul style="list-style-type: none"> ● Low temperature of power line oil ● Lack of drive power from engine 	<ul style="list-style-type: none"> ● Warm up machine ● See ENGINE RELATED PARTS
Machine dose not move off when steering, directional and gear shift lever is placed in gear	<ul style="list-style-type: none"> ● Lack of oil in power train case ● Transmission oil pressure dose not rise ● Brake lock lever in LOCK position ● Wear, scuffing of gear pump 	<ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● See "Transmission oil pressure dose not rise" above ● Set lever in free position (● Check, repair)
Torque converter overheats (indicator enters red range)	<ul style="list-style-type: none"> ● Lack of oil in power train case ● Transmission oil pressure dose not rise ● Wear, scuffing of gear pump ● Excessive load when operating 	<ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● See "Transmission oil pressure dose not rise" above (● Check, repair) <ul style="list-style-type: none"> ● Shift down one position, or reduce the load and increase the speed when operating

ENGINE

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure caution lamp remains alight when engine speed is raised after completion of warm-up	<ul style="list-style-type: none"> ● 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 caution lamp 	<ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● Replace cartridge, see EVERY 250 HOURS SERVICE (● Check, repair) (● Replace)
Steam is emitted from top part of radiator (pressure valve)	<ul style="list-style-type: none"> ● Cooling water level low, water leakage ● Loose fan belt ● Dirt or scale accumulated in cooling system 	<ul style="list-style-type: none"> ● Add cooling water, repair, see CHECK BEFORE STARTING ● Adjust fan belt tension, see EVERY 250 HOURS SERVICE ● Change cooling water, clean inside of cooling system, see WHEN REQUIRED
Indicator of water temperature gauge is in red range on right side of gauge	<ul style="list-style-type: none"> ● Clogged radiator fin or damaged fin ● Defective thermostat ● Loose radiator filler cap (high altituded operation) ● Defective water temperature gauge 	<ul style="list-style-type: none"> ● Clean or replace, see WHEN REQUIRED (● Replace thermostat) ● Tightening cap or replace packing (● Replace water temperature gauge)
Indicator of water temperature gauge is in white range on left side of gauge	<ul style="list-style-type: none"> ● Defective thermostat ● Defective water temperature gauge 	<ul style="list-style-type: none"> (● Replace thermostat) (● Replace water temperature gauge)
Engine dose not start when starting motor is turned	<ul style="list-style-type: none"> ● Lack of fuel ● Air in fuel system ● Defective fuel injection pump or nozzle ● Starting motor cracks engine sluggishly ● Glow signal dose not glow red ● Defective compression <ul style="list-style-type: none"> ● Defective valve clearance 	<ul style="list-style-type: none"> ● Add fuel, see CHECK BEFORE STARTING ● Repair place where air is sucked in (● Replace pump or nizzle) ● See ELECTRICAL SYSTEM ● See ELECTRICAL SYSTEM (● Adjust valve clearance)
Exhaust gas is white or blue	<ul style="list-style-type: none"> ● Too mach oil in oil pan ● Improper fuel 	<ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● Change to specified fuel
Exhaust gas occasionally turns black	<ul style="list-style-type: none"> ● Clogged air cleaner element ● Defective nozzle ● Defective compression 	<ul style="list-style-type: none"> ● Clean or replace, see WHEN REQUIRED (● Replace nozzle) (● Adjust valve clearance)
Combustion noise occasionally makes breathing sound	<ul style="list-style-type: none"> ● Defective nozzle 	<ul style="list-style-type: none"> (● Replace nozzle)

Problem	Main causes	Remedy
Abnormal noise generated (combustion or mechanical)	<ul style="list-style-type: none">● Low grade fuel being used● Overheating ● Damage inside muffler● Excessive valve clearance	<ul style="list-style-type: none">● Change to specified fuel● See item "Indicator of water temperature gauge is in red range on right side of gauge" (<ul style="list-style-type: none">● Replace muffler)(● Adjust valve clearance)

MAINTENANCE

 **WARNING**

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

GUIDE TO MAINTENANCE

Do not carry out 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 carried out.

KOMATSU GENUINE REPLACEMENTPARTS:

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 windshield washer fluid, and be sure 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 DRAINED OIL:

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantities of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

FUEL STRAINER:

If your machine is equipped with a fuel strainer, do not remove it while fueling.

WELDING INSTRUCTIONS:

- Turn off the engine starting switch.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1m (3.3 ft) from the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may have troubles.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- 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 will cause damage and 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:

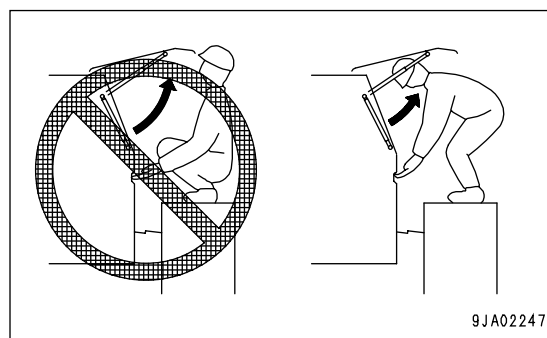
- Inspect the air cleaner clogging monitor frequently to see if the air cleaner is clogged.
Clean the air cleaner element at a shorter interval than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially 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:

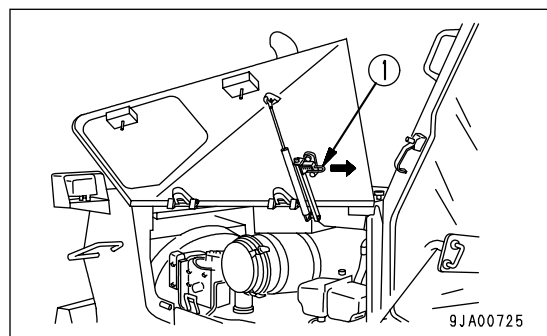
Never mix different kinds of oil. If a different type of oil has to be added, drain the old oil and replace all the oil with the new type of oil.

PRECAUTIONS WHEN OPENING AND CLOSING ENGINE SIDE COVER:

- Open the engine side cover all the way and ensure 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.



- Close the engine side cover before opening or closing the cab door.
- The lock must be released before closing the engine side cover; it cannot be closed without releasing the lock. If force is used to try to close the cover, the cover will break. To release the lock, pull lever (1) in the direction of the arrow.



LOOKING THE INSPECTION COVERS:

When carrying out maintenance with the inspection cover open, lock it in position securely with a lock bar. If inspection or maintenance is carried out with the inspection cover open and not locked in position, there is a hazard that it may be suddenly blown shut by the wind and cause injury to the worker.

HYDRAULIC SYSTEM - AIR BLEEDING

After repairing or replacing the 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 OF HYDRAULIC SYSTEM (PAGE 4-38)".

HYDRAULIC HOSE INSTALLATION:

- 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 them or bend them into loops with a small radius.

This will cause damage to the hose and markedly reduce its service life.

CHECK AFTER INSPECTION AND MAINTENANCE WORKS:

If you forget to carry out the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do as follows.

- Checks after operation (with engine stopped)
 - Have any inspection and maintenance points been forgotten?
 - Have all inspection and maintenance items been carried out correctly?
 - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside machine and get caught in the lever linkage mechanism.
 - Is there any leakage of water or oil? Have all the 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 (PAGE 2-29)" 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

OIL

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and is deteriorates with use.
Always use oil that matches the grade and temperature for use given 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 machine 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 to 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

- 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)), so it is necessary to change to a fuel that matches the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- 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 amounts 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 anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped. This anti-freeze is effective in preventing corrosion of the cooling system.
The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze 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 (PAGE 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 used when overhauling, so they do not need grease.
If any part becomes stiff or generates noise after being used for a long time, grease it.
- 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.

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 drum can is at the side. (To prevent moisture from being sucked in)
If drum cans 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, please 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 electrical leakage 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 check of fan belt tension, check of damage or wear in the fan belt and check of battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electrical interference may cause malfunction of the control system controller, so before installing a radio receiver or other wireless equipment, please contact your Komatsu distributor.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- When installing an operator's cab cooler or any other electrical equipment, connect it to an independent power source connector. The optional power source must never be connected to the fuse, starting switch, or battery relay.

HANDLING HYDRAULIC SYSTEM

- The hydraulic equipment is at high temperature during operations or after completion of operations. In addition, it is also under high pressure during operations, so pay careful attention to the following points when carrying out inspection and maintenance of the hydraulic system and components.
 - Stop the machine on level ground, lower the dump body, and take action to ensure that no pressure is applied to the cylinder circuit.
 - Always stop the engine.
 - Immediately after stopping operations, the hydraulic oil and lubricating oil is at high temperature and high pressure, so wait for the temperature at all parts to go down before starting maintenance.
Even when the temperature goes down, some parts may be under internal pressure, so when loosening plugs, threads, or hose connections, do not stand immediately in front of the part. Loosen the parts slowly to release the internal pressure before removing them.
 - When carrying out inspection and maintenance of the hydraulic circuit, always release the air from the hydraulic tank to remove the internal pressure.

- Inspection and maintenance includes inspection of the hydraulic oil level, replacement of filters, and changing the hydraulic oil.
- When removing high-pressure hoses, check that there is no damage to the O-ring. If any damage is found, replace.
- If the hydraulic filter element, strainer, or other parts have been replaced or washed, or if any hydraulic equipment has been repaired or replaced, or hydraulic piping has been removed, it is necessary to bleed the air from inside the circuit.

WEAR PARTS

Wear parts such as the filter element, air cleaner element etc. are to be replaced at the time of periodic maintenance or before their abrasion limits.

The wear parts should be changed correctly in order to use the machine economically.

When changing parts, use Komatsu genuine parts of excellent quality.

When ordering parts, please check the part number in the parts book.

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	6732-71-6111	Cartridge	-	1		
Engine oil filter	6742-01-4120	Cartridge	-	1		
Corrosion resistor	6742-01-3970	Cartridge	-	1		
Hydraulic filter	21N-60-12210	Cartridge	-	1	Every 2000 hours service	
Air cleaner	600-185-4100	Element assembly (outer and inner)	-	1	-	
Air conditioner	Fresh filter	14X-911-7750	Filter	-	2	-
	Recirc filter	14X-911-7741	Filter	-	1	
Blade	D61PX Power angle Powertilt dozer	13G-72-61420	Cutting edge (out)	24.3	2	-
		13G-72-61410	Cutting edge (in)	39.0	1	
		14Y-71-11330	End bit (left)	-	1	
		14Y-71-11340	End bit (right)	-	1	
		(02090-11265)	(Bolt)	-	(32)	
		(02290-11219)	(Nut)	-	(32)	
	D61EX Power angle Powertilt dozer	134-72-61420	Cutting edge (left)	36.8	1	-
		134-72-61410	Cutting edge (right)	24.3	1	
		14Y-71-11330	End bit (left)	-	1	
		14Y-71-11340	End bit (right)	-	1	
		(02090-11265)	(Bolt)	-	(27)	
		(02290-11219)	(Nut)	-	(27)	
	D61PX Powertilt dozer	14Y-71-11210	Cutting edge (left)	45.5	1	-
		13G-71-61410	Cutting edge (right)	39.0	1	
		14Y-71-11330	End bit (left)	-	1	
		14Y-71-11340	End bit (right)	-	1	
(02090-11270)		(Bolt)	-	(32)		
(02290-11219)		(Nut)	-	(32)		
D61EX Semi-U blade	13G-72-61420	Cutting edge (left)	25	1	-	
	14X-71-11310	Cutting edge (right)	38.4	1		
	175-71-22272	End bit (left)	39.0	1		
	175-71-22282	End bit (right)	39.0	1		
	(02090-11265)	(Bolt)	-	(15)		
	(02290-11219)	(Nut)	-	(15)		
(02090-11495)	(Bolt)	-	(14)			
(02290-11422)	(Nut)	-	(14)			

NOTICE

When handling parts that weight more than 25kg, 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			
					SAE10W				
				SAE10W-30					
			SAE15W-40						
		SAE5W-30							
Damper case					SAE30				
Idler (each)									
Hydraulic system					SAE10W				
				SAE10W-30					
			SAE15W-40						
Power train case				SAE30					
Final drive case (each)			SAE10W						
Fuel tank	Diesel fuel			ASTM D975 No.2					
		*1							
Grease fitting	Grease			NLGI No.2					
Cooling system	Water	Add antifreeze							

*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	liters	23	1.3	0.22	73	75	32	315	44
	US gal	6.07	0.34	0.06	19.27	19.8	8.45	83.16	11.62
Refill capacity	liters	19	1.3	0.22	48	44	28.5	-	-
	US gal	5.02	0.34	0.06	12.67	11.62	7.52	-	-

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.
Change oil according to the following table if fuel sulphur content is above 0.5%.
- When starting the engine in 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 an atmospheric temperature goes up to 10°C (50°F) more or less in the day time.
Use CE or CF class oil for the engine oil.
- 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 in the table.
- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Institute

Fuel sulphur content	Charge interval 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 plus	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	Antifreeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	-
14	PENNZOIL	*Superme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White-bearing grease	Anti-freeze and summer coolant

MAINTENANCE
USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

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
15	PETROFINA	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 pres- tige 2EP Sun prestige 742	Sunoco antifreeze and summer cool- ant
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

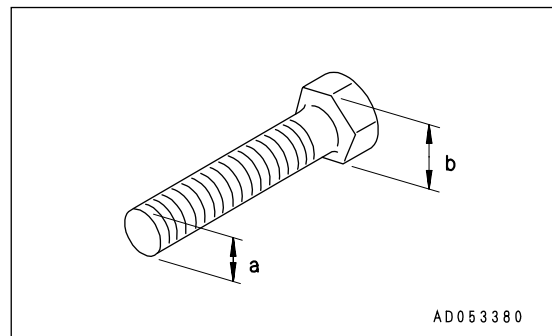
If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation. Always pay careful attention when tightening parts.

Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below.

The tightening torque is determined by the width across the flats of the nut and bolt.

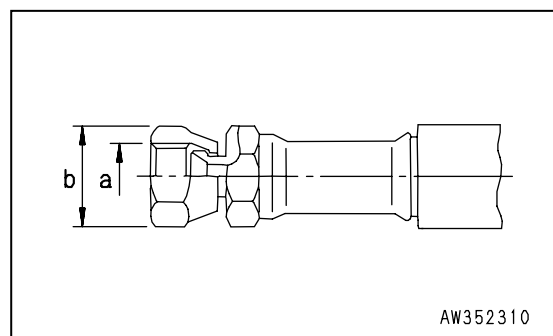
If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter a(mm)	Width across flat b(mm)	Tightening torque [N•m (kgf•m)]	
		Target value	Service limit
6	10	13.2 (1.35)	11.8 - 14.7 (1.2 - 1.5)
8	13	31 (3.2)	27 - 34 (2.8 - 3.5)
10	17	66 (6.7)	59 - 74 (6.0 - 7.5)
12	19	113 (11.5)	98 - 123 (10.0 - 12.5)
14	22	177 (18.0)	157 - 196 (16.0 - 20.0)
16	24	279 (28.5)	245 - 309 (25.0 - 31.5)
18	27	382 (39.0)	343 - 425 (35.0 - 43.5)
20	30	549 (56.0)	490 - 608 (50.0 - 62.0)
22	32	745 (76.0)	662 - 829 (67.5 - 84.5)
24	36	927 (94.5)	824 - 1030 (84.0 - 105.0)
27	41	1320 (135.0)	1180 - 1470 (120.0 - 150.0)
30	46	1720 (175.0)	1520 - 1910 (155.0 - 195.0)
33	50	2210 (225.0)	1960 - 2450 (200.0 - 250.0)
36	55	2750 (280.0)	2450 - 3040 (250.0 - 310.0)
39	60	3280 (335.0)	2890 - 3630 (295.0 - 370.0)



Apply the following table for Hydraulic Hose.

Thread diameter a(mm)	Width across flat b(mm)	Tightening torque [N•m (kgf•m)]	
		Target value	Service limit
14	19	44.1 (4.5)	34.3 - 63.7 (6.0 - 10.0)
18	24	78.5 (8.0)	58.8 - 98.1 (6.0 - 10.0)
22	27	117.7 (12.0)	88.3 - 137.3 (9.0 - 14.0)
24	32	147.1 (15.0)	117.7 - 176.5 (12.0 - 18.0)
30	36	215.7 (22.0)	176.5 - 245.2 (18.0 - 25.0)
33	41	255.0 (26.0)	215.7 - 284.4 (22.0 - 29.0)



PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the parts in the safety-critical parts list on the next page must also be replaced at the specified interval. These parts are particularly closely connected to safety and fire prevention, so please contact your Komatsu distributor to have them replaced.

With these parts, the material changes as time passes, or they easily wear out or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses.

In addition, carry out the following checks for the hydraulic hoses not listed as periodic replacement parts. If any abnormality is found, tighten or replace the parts.

When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

Ask your Komatsu distributor to 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, CLEAN AND REPLACE AIR CLEANER ELEMENT	4-19
CLEAN INSIDE OF COOLING SYSTEM.....	4-23
CHECK TRACK TENSION	4-25
CHECK AND TIGHTEN TRACK SHOE BOLTS	4-26
CHECK ELECTRICAL INTAKE AIR HEATER	4-27
REVERSE AND REPLACE THE END BITS AND CUTTING EDGES.....	4-28
CLEAN, CHECK RADIATOR FINS	4-29
ADJUST IDLER CLEARANCE.....	4-30
ADJUSTING TENSION OF CENTER BRACE.....	4-31
CHECK, INSPECTION AIR CONDITIONER (Mechine equipped with cab)	4-32
GREASE DOOR HINGE (Mechine equipped with cab)	4-33
CHECK DOOR LOCK STRIKER (Mechine equipped with cab)	4-33
REPLACE DOOR DAMPER (Mechine equipped with cab)	4-33
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID (Mechine equipped with cab).....	4-34
REPLACE WIPER BLADE (Mechine equipped with cab).....	4-35
CHECK IDLER OIL LEVEL, ADD OIL.....	4-36
CHECK OIL LEVEL IN DAMPER CASE, ADD AND CHANGE OIL	4-37
PROCEDURE FOR BLEEDING AIR OF HYDRAULIC SYSTEM.....	4-38
PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM.....	4-39

CHECK BEFORE STARTING

EVERY 50 HOURS SERVICE

DRAIN WATER, SEDIMENT FROM FUEL TANK.....	4-41
LUBRICATING	4-41

EVERY 250 HOURS SERVICE

LUBRICATING 4-42

GREASE EQUALIZER BAR SIDE PIN 4-43

GREASE EQUALIZER BAR CENTER PIN 4-43

CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL 4-44

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL 4-44

CHECK LEVEL OF BATTERY ELECTROLYTE 4-45

CHECK FAN BELT TENSION, ADJUST 4-46

CHECK, CLEAN FUEL STRAINER 4-47

CHECK BRAKE PERFORMANCE 4-47

CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (Mechine equipped with cab) 4-48

EVERY 500 HOURS SERVICE

REPLACE FUEL FILTER CARTRIDGE 4-49

CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE 4-50

REPLACE CORROSION RESISTOR CARTRIDGE 4-51

REPLACE POWER TRAIN OIL FILTER ELEMENT 4-51

EVERY 1000 HOURS SERVICE

CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS
(POWER TRAIN STRAINER, SCAVENGING PUMP STRAINER) 4-52

CHANGE OIL IN FINAL DRIVE CASE 4-54

CLEAN BREATHER 4-54

GREASE UNIVERSAL JOINT 4-55

CHECK ALL TIGHTENING PARTS OF TURBOCHARGER 4-56

CHECK PLAY OF TURBOCHARGER ROTOR 4-56

CHECK FOR LOOSE ROPS MOUNT BOLTS (if equipped) 4-56

EVERY 2000 HOURS SERVICE

CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMET
AND CLEAN SUCTION STRAINER 4-57

CLEAN, CHECK TURBOCHARGER 4-58

CHECK VIBRATION DAMPER 4-58

CHECK ALTERNATOR, STARTING MOTOR 4-58

EVERY 4000 HOURS SERVICE

CHECK WATER PUMP 4-59

SERVICE PROCEDURE

WHEN REQUIRED

CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

WARNING

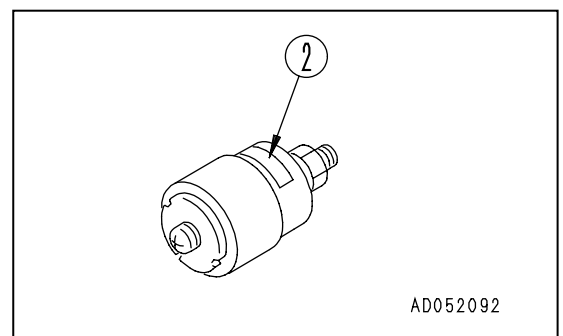
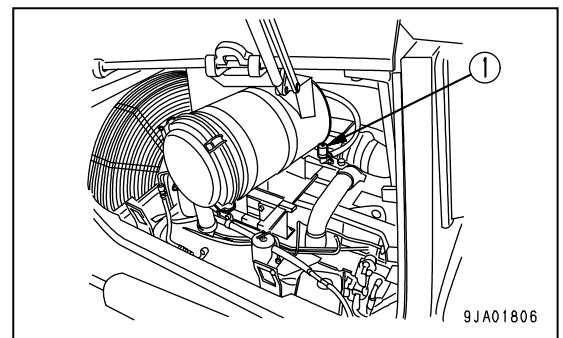
- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and the engine will suffer damage. Always stop the engine before carrying out these operations.
- When using compressed air, there is danger that dirt may be blown around and cause serious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

CHECKING

1. Open the left engine side cover.
To prevent entry of dirt and dust, cover the air connector side of the rear end of the air cleaner with a clean cloth and adhesive tape.
2. If transparent part(2) of dust indicator(1) is red, clean the air cleaner element.

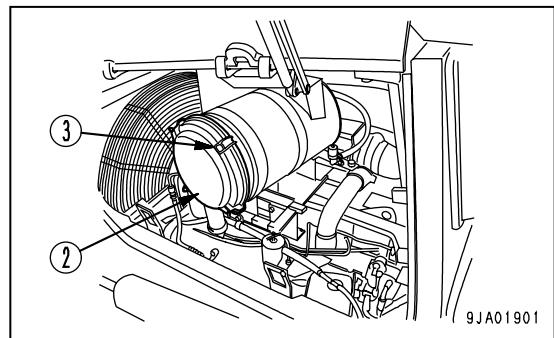
NOTICE

Do not clean the air cleaner element before the dust indicator becomes red. If the element is cleaned frequently before the dust indicator becomes red, the performance of the air cleaner is not used perfectly and the cleaning effect is lowered. In addition, dust sticking to the element falls into the inner element each time the element is cleaned.



CLEANING OR REPLACING OUTER ELEMENT

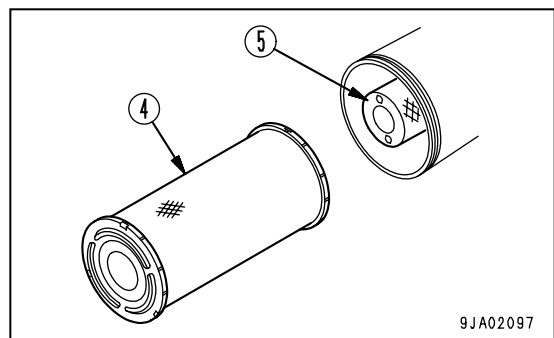
1. Open the left engine side cover.
2. Remove four clips(2) to remove dust cup(3).



NOTICE

Never remove inner element (5). If it is removed, dust will enter and cause an engine trouble.

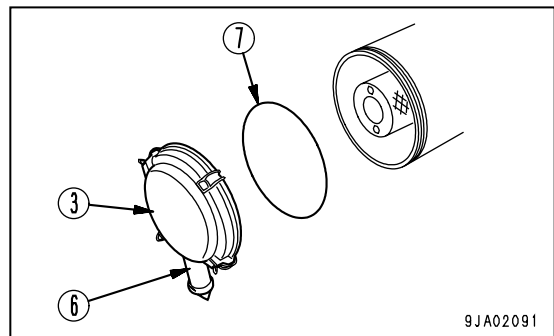
3. Remove outer element(4).



NOTICE

When cleaning the dust cup, do not remove evacuator valve(6).

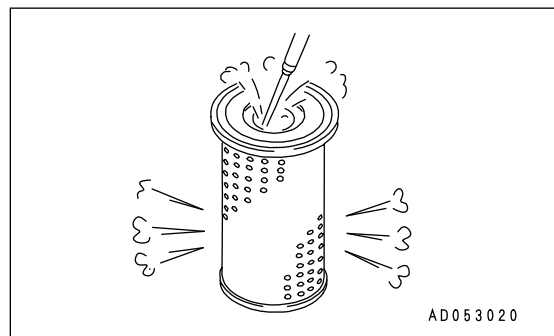
4. Clean the inside of the air cleaner body and dust cup.



NOTICE

The inner element must not be cleaned and used again. When replacing the outer element, replace the inner element at the same time.

5. Direct dry compressed air (less than 0.69MPa (7kg/cm², 99.4PSI)) to the outer element(4) from inside along its folds, then direct it from outside along its folds and again from inside.

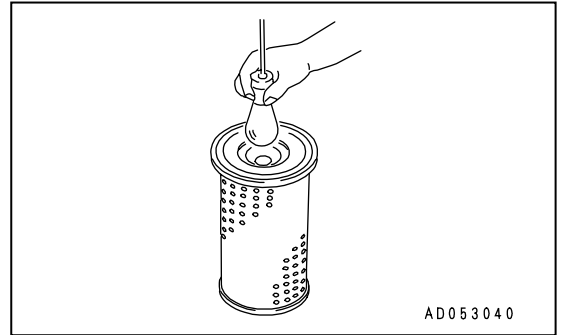


- 1) Replace the outer element if it has been cleaned 6 times repeatedly or used throughout a year. Replace the inner element at the same time.
- 2) Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned 6 times.

- 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 or gasket or seal are damaged.



- Set the cleaned outer element and install dust cup(3), then secure them with clips(2).

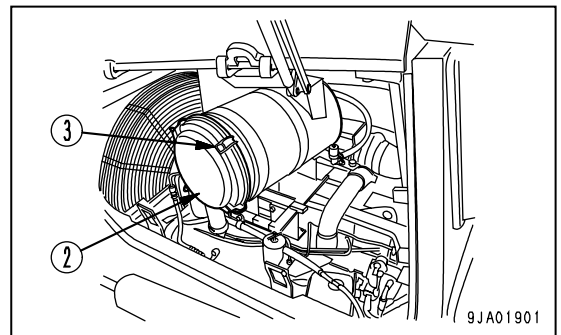
⚠ CAUTION

When installing the dust cup, check O-ring(7). If the O-ring has any defect, replace it.

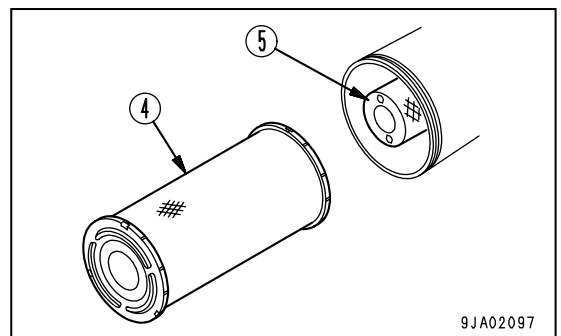
- Return the red piston in the dust indicator(1) to its original position.
- Close the left engine side cover.

REPLACING ELEMENT

- Open the left engine side cover.
- Remove four clips(2) to remove dust cup(3).



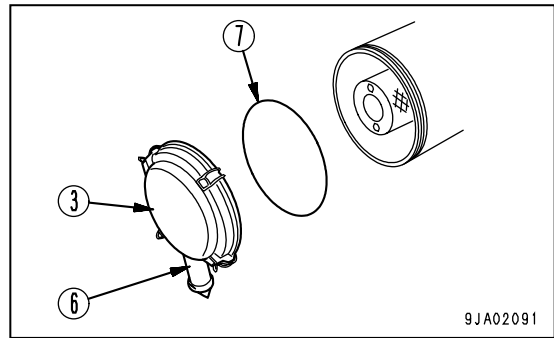
- Remove outer element(4). Do not remove inner element(5) at this time, however.



NOTICE

When cleaning the dust cup, do not remove evacuator valve(6).

4. Clean the inside of the air cleaner body and dust cup.



5. Remove inner element(5), then install a new inner element immediately.
6. Set new outer element(4) and install dust cup(3), then secure them with clips(2).

⚠ CAUTION

When installing the dust cup, check O-ring(7). If the O-ring has any defect, replace it.

7. Return the red piston in the dust indicator(1) to its original position.
8. Close the left engine side cover.

CLEAN INSIDE OF COOLING SYSTEM

WARNING

- Just after the engine is stopped, the cooling water 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 lowers, 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 safety lock lever and brake lock lever in the LOCK positions.
- For the starting method of the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (PAGE 3-38)" and "STARTING ENGINE (PAGE 3-54)" in OPERATION in the volume of operation.
- Never go into under the machine body while the engine is running. It is very dangerous since the machine may move suddenly.

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

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	

Stop the machine on level ground when cleaning or changing the coolant.

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol. Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect.

The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.

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 (50°F) lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	liters	13.2	15.8	18.0	20.2	22.0
	US gal	3.48	4.17	4.75	5.33	5.81
Amount of water	liters	30.8	28.2	26.0	23.8	22.0
	US gal	8.13	7.44	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 quantities of fresh water and see a doctor at once.

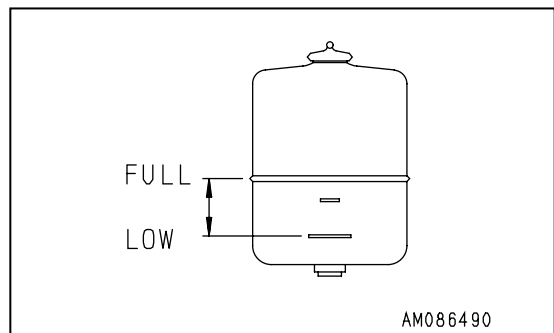
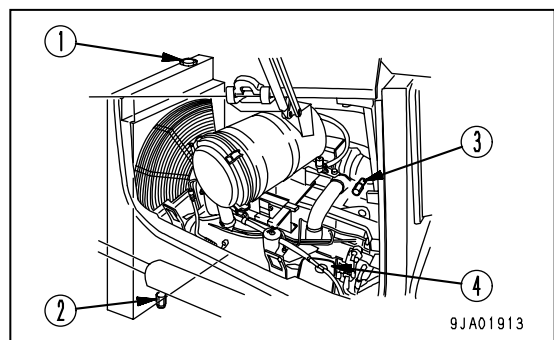
Use city water for the cooling water.

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 44 liters (11.62US gal) to receive the antifreeze solution.

1. Stop the engine.
2. Turn radiator cap(1) slowly to remove it.
3. Place a container to receive the antifreeze solution under drain valve(2) on the underside of the radiator and drain plug(3) on the side of the cylinder block. Open drain valve(2) and remove drain plug(3) to drain the antifreeze solution.
4. After draining the antifreeze solution, close drain valve(2) and tighten drain plug(3), then pour city water. After the radiator is filled with the water, start and run the engine at low idling speed. After the water temperature rises above 90°C, run the engine for about 10 minutes.
5. Stop the engine and open drain valve(2) and remove drain plug(3) to drain the water.
6. After draining the water, clean the cooling system with cleaning agent. For the cleaning method, see the instructions for the cleaning agent.
7. Close drain valve(2). Wind seal tapes onto drain plug(3), then tighten it.
8. Add water through the water filler up to the filler port.
9. To remove the air in the cooling water, run for five minutes at low idling, then for another five minutes at high idling. When doing this, leave radiator cap (2) off.
10. Drain the cooling water inside sub-tank(4), clean the inside of the sub-tank, then fill again with cooling water to a point midway between the FULL and LOW marks.
11. Stop the engine and tighten the cap. Check the coolant level and add water if necessary.



CHECK TRACK TENSION

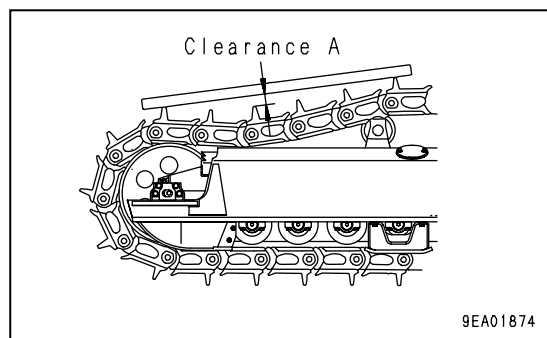
The wear of pins and bushings on the undercarriage will vary with the working conditions and types of soil. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

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 30mm (0.79 to 1.18in), the tension is standard.

If the track tension is not at the standard value, adjust it in the following manner.



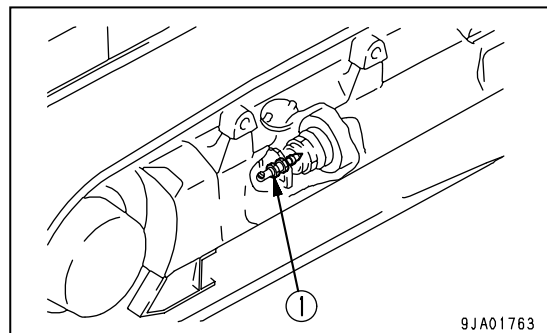
ADJUSTMENT

⚠ WARNING

Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator(1) under pressure can penetrate the body causing injury or death.

For this reason, do not loosen lubricator(1) more than one turn. Do not loosen any part other than lubricator(1). Furthermore, do not bring your face in front of the grease fitting.

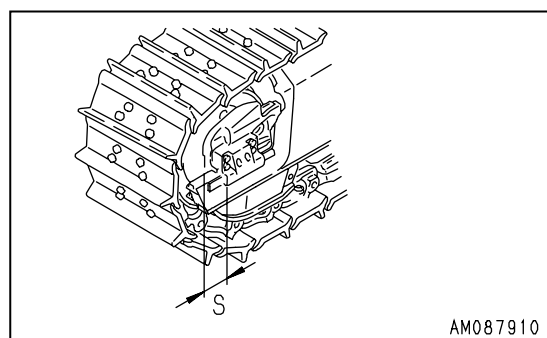
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



WHEN INCREASING TENSION

Prepare a grease gun.

1. Pump in grease through the grease fitting 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 0mm. 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.

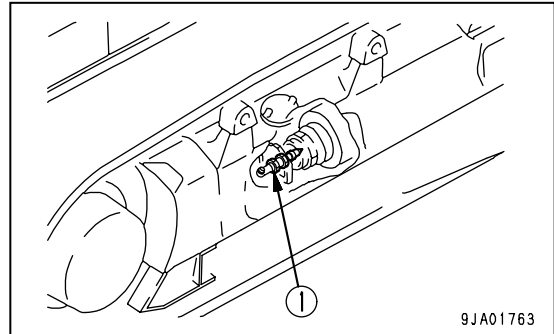


WHEN LOOSENING TENSION

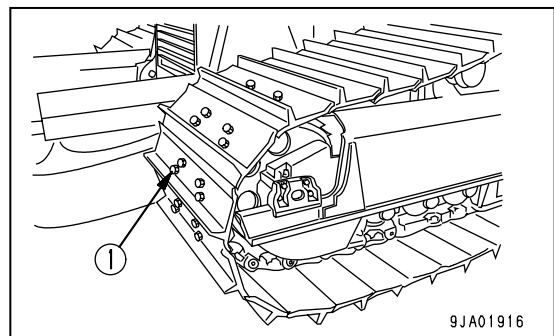
⚠ WARNING

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.

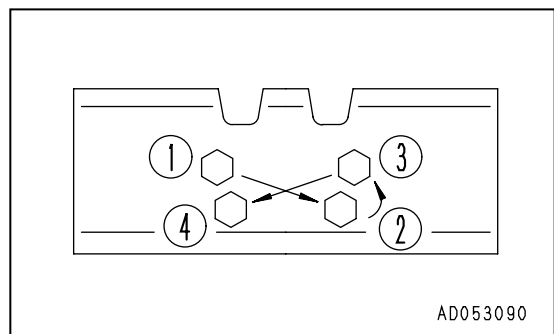
1. Loosen lubricator(1) gradually to release the grease.
2. Turn lubricator(1) a maximum of one turn.
3. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
4. Tighten lubricator(1).
5. To check that the correct tension has been achieved, move the machine 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.

**ORDER FOR TIGHTENING**

Tighten the bolts in the order shown in the diagram on the right.

**METHOD FOR TIGHTENING (SHOE BOLT)**

1. First tighten to a tightening torque of $392 \pm 39.2\text{N}\cdot\text{m}$ ($40 \pm 4\text{kgf}\cdot\text{m}$, $290 \pm 30\text{lbf}\cdot\text{ft}$) then check that the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further $120^\circ \pm 10^\circ$.

METHOD FOR TIGHTENING (MASTER LINK CONNECTING BOLT)

1. First tighten to a tightening torque of $343 \pm 39\text{N}\cdot\text{m}$ ($35 \pm 4\text{kgf}\cdot\text{m}$, $253 \pm 29\text{lbft}$) 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: $0^\circ - 20^\circ$).

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 THE END BITS AND CUTTING EDGES

⚠ WARNING

It is dangerous if the work equipment moves by mistake when the cutting edges and end bits are being reversed or replaced. Set the work equipment in a stable condition, then stop the engine and lock the blade control lever securely with the safety lock lever.

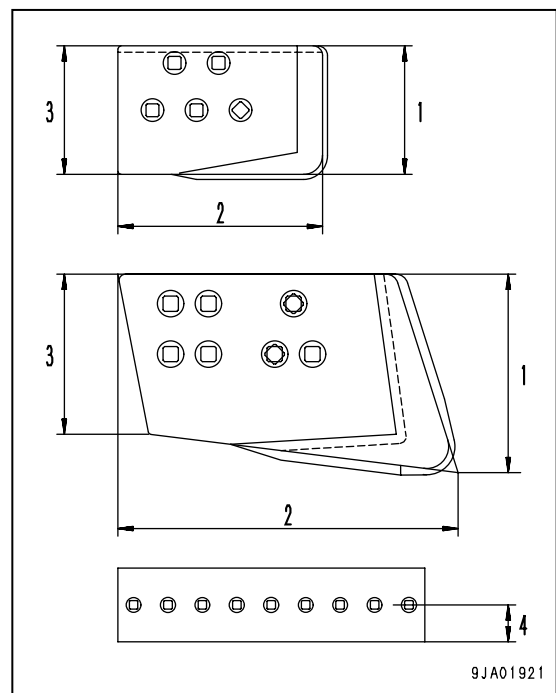
Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height and apply a block to the frame so as to prevent fall of the blade.
2. Operate the safety lock lever to the LOCK position.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

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	204
		B	237	204
		C	237	204
		D	315	254
2	Width of end bit	A	325	300
		B	325	300
		C	325	300
		D	540	515
3	Height of inside of end bit	A	204	187
		B	204	187
		C	204	187
		D	254	237
4	Height of cutting edge (from center of bolt mounting hole to end face)	A	102	85
		B	102	85
		C	102	85
		D	102	85



The symbols in the work equipment column have the following meaning.

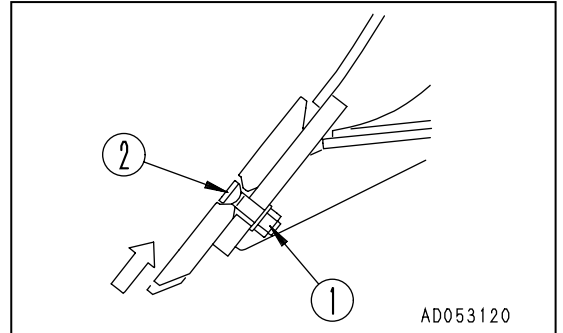
- A: Power angle, powertilt dozer (D61EX)
- B: Power angle, powertilt dozer (D61PX)
- C: Powertilt dozer (D61PX)
- D: Semi-U blade (D61EX)

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.

- 1) Remove nut(1) and bolt(2), then replace or reverse the cutting edge and the end bit.
- 2) 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): $461 \pm 69\text{N}\cdot\text{m}$ ($47 \pm 7\text{kgf}\cdot\text{m}$, $340 \pm 51\text{lbft}$)

Powertilt dozer(PX): $461 \pm 69\text{N}\cdot\text{m}$ ($47 \pm 7\text{kgf}\cdot\text{m}$, $340 \pm 51\text{lbft}$)

Semi-U dozer (EX) (cutting edge): $461 \pm 69\text{N}\cdot\text{m}$ ($47 \pm 7\text{kgf}\cdot\text{m}$, $340 \pm 51\text{lbft}$)

Semi-U dozer (EX) (end bit): $745 \pm 108\text{N}\cdot\text{m}$ ($76 \pm 11\text{kgf}\cdot\text{m}$, $549.7 \pm 79.6\text{lbft}$)

If bolt(2) and nut(1) are damaged, replace them with new ones at the same time.

6. After several hours of running, retighten the nuts.

CLEAN, CHECK RADIATOR FINS

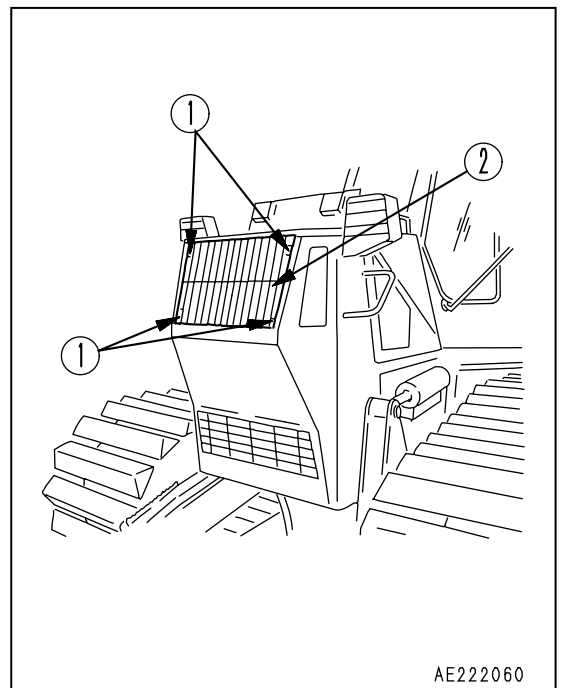
If the radiator fins are clogged or dirty, clean and inspect them.

1. Remove bolts(1) (4 bolts), then remove cover(2).
2. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.

REMARK

Check the rubber hose. If the hose is found to have cracks to be hardened by ageing, replace such hose with new one. Further, loosen hose clamp should also be checked.

3. Install cover(2), and tighten bolts(1).



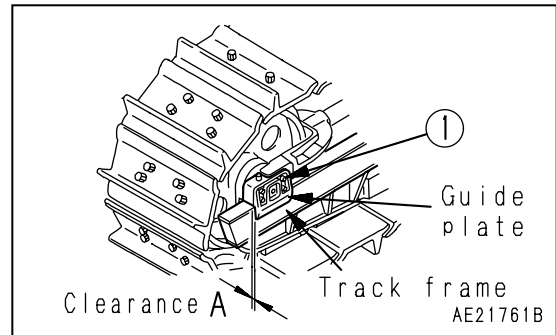
ADJUST IDLER CLEARANCE

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. Move the machine by 1 to 2m (3ft 3in to 6ft 7in) on a level place, then measure clearance A between the track frame and guide plate (at four places of both sides, inside, and outside).
2. If the clearance A exceeds 4.0mm (0.16in), loosen bolt(1), and pull out the shim to adjust the clearance at one end to 0.5 to 1.0mm (0.02 to 0.04in). Thickness of one shim is 1.0mm (0.04in).



ADJUSTING TENSION OF CENTER BRACE

(Power tiltdozer only)

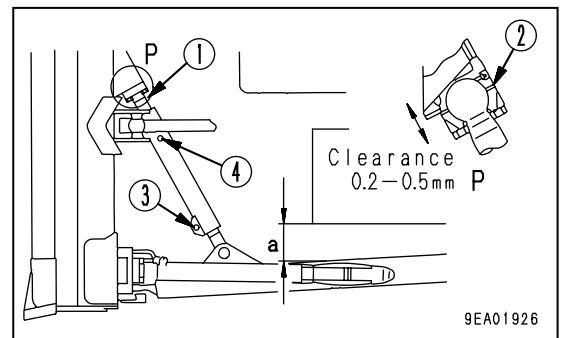
When the blade assembly is removed for transportation, the tension of the center brace must be adjusted when the blade is assembled again. If the tension is not adjusted, the bushing at the blade and straight frame mount will come out, and soil will enter. This will result in damage or premature wear of the bushing.

ADJUSTMENT

WARNING

Except when operating the blade in Step 4, always lock the blade control lever securely with the safety lock lever.

1. Adjust with shim(2) so that the play of ball joint(1) is 0.2 to 0.5mm (0.008 to 0.020in).
2. Loosen bolt(3).
3. Install the blade assembly.
4. Operate the blade control lever to float the blade.
5. Insert a bar in hole(4) in the center brace, and turn it in the direction of protrusion. When doing this, adjust so that clearance D between the track and frame is the same on the left and right sides.



Rotating torque: 24.5 to 49N•m (2.5 to 5kgf•m, 18.1 to 36.2lbft) (Blade at FLOAT)

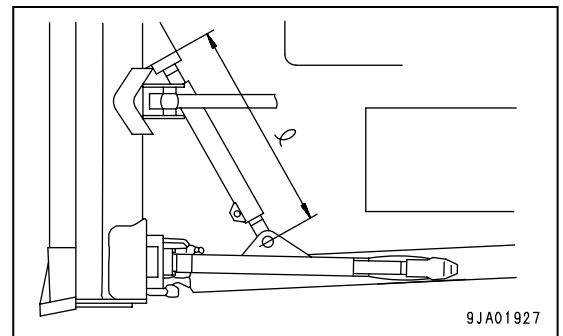
Standard distance (ℓ) between joints is shown below.

D61EX: 758mm (29.9in)

D61PX: 766mm (30.2in)

6. Tighten bolt(3).

Tightening torque: $441 \pm 49\text{N}\cdot\text{m}$ ($45 \pm 5\text{kgf}\cdot\text{m}$, $325 \pm 36\text{lbft}$)

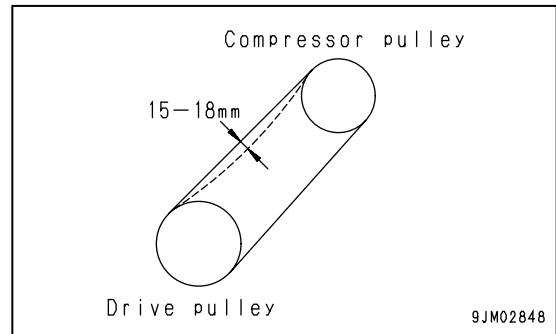


CHECK, INSPECTION AIR CONDITIONER

(Machine equipped with cab)

CHECKING TENSION OF COMPRESSOR BELT

If the belt is loose, it will slip and the cooling effect will be reduced. From time to time, press a point midway between the drive pulley and compressor pulley with your finger (approx. 98N (10kgf, 22.05 lb)) and check that the tension is 15 to 18mm (0.59 to 0.71in). When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.



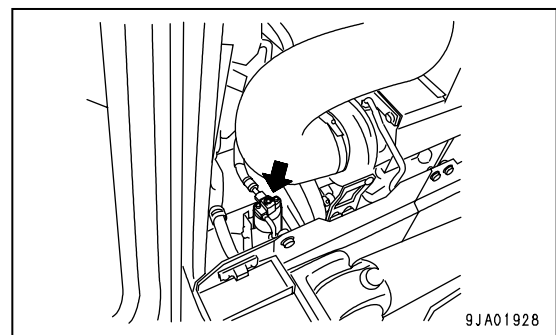
CHECK LEVEL OF REFRIGERANT (GAS)

⚠ WARNING

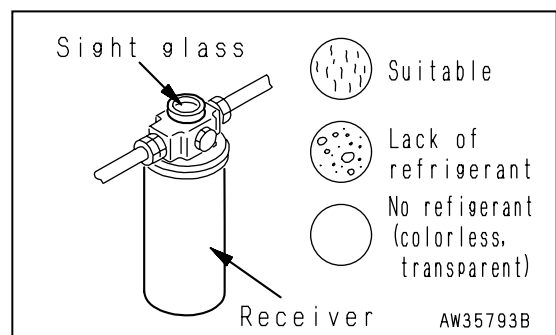
If the refrigerant used in the cooler gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.

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 in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.



- No bubbles in refrigerant flow: Suitable
- Some bubbles in flow (bubbles pass continuously): Lack of refrigerant
- Colorless, transparent: No refrigerant



REMARK

- When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.
- New Freon R134a is used as the refrigerant.

OPERATING THE AIR CONDITIONER OFF-SEASON

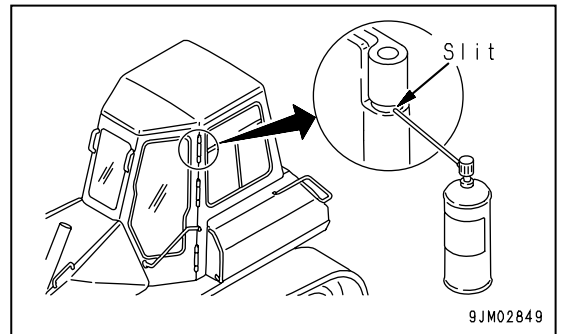
Even during the off-season, run the compressor at low speed for 3 to 5 minutes once a month to prevent the loss of the oil film at the lubricated parts of the compressor.

GREASE DOOR HINGE

(Machine 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.

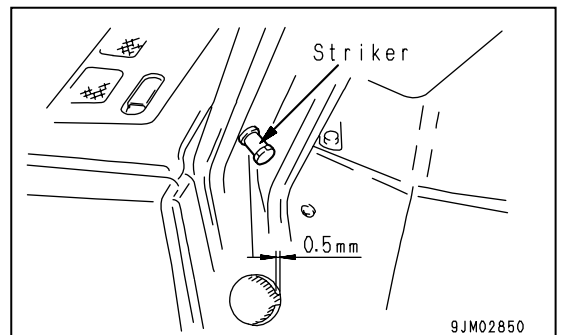
If the bushing is worn, replace the hinge.



CHECK DOOR LOCK STRIKER

(Machine equipped with cab)

If the wear of the doors lock striker exceeds 0.5mm (0.02in), replace the striker. If it is used at it is, the play will increase and this may result in breakage of the hinge or door lock.

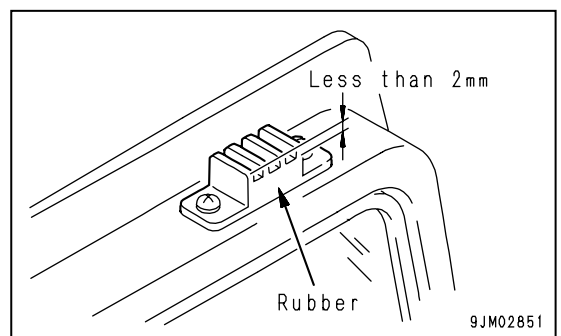


REPLACE DOOR DAMPER

(Machine equipped with cab)

If the depth of the door damper rubber groove is less than 2mm (0.08in), replace the damper.

There are four dampers each at the top and bottom on the left and right doors.



CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

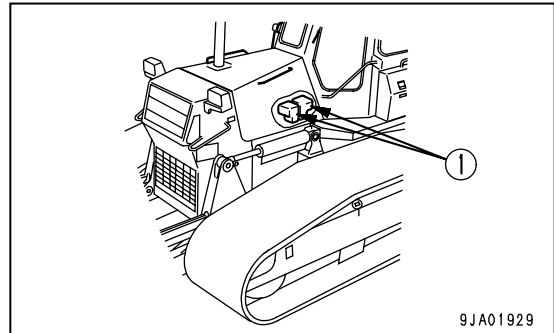
(Machine equipped with cab)

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 dirt or dust get in.

When adding fluid, be careful not to let any dust get in.



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PROPORTION FOR MIXING WASHER FLUID WITH WATER

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportions before adding.

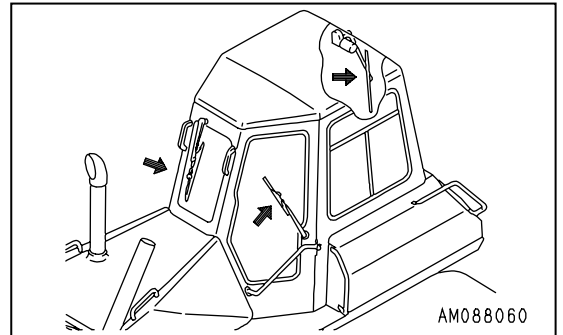
Area, season	Proportions	Freezing temperature
Normal	Washer fluid 1/3 : water 2/3	-10°C (14°F)
Winter in cold area	Washer fluid 1/2 : water 1/2	-20°C (-4°F)
Winter in extremely cold area	Pure washer fluid	-30°C (-22°F)

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

(Machine equipped with cab)

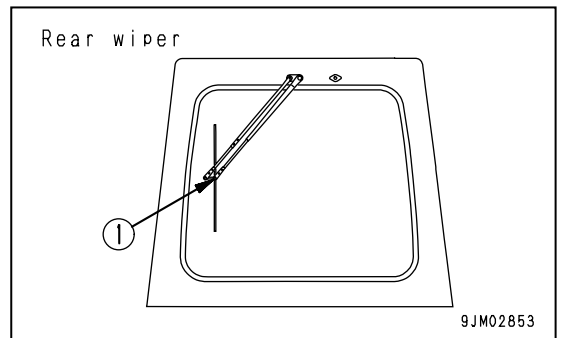
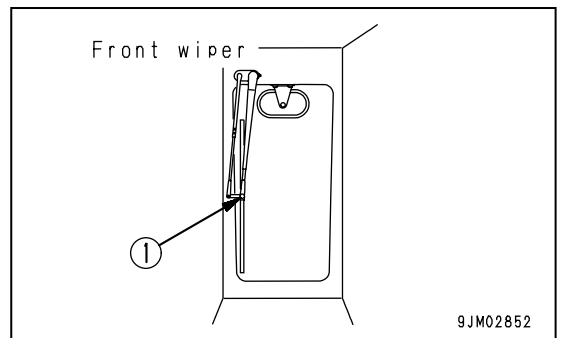
If the blade is damaged, it will not wipe the window clean, so replace the blade.



REPLACEMENT

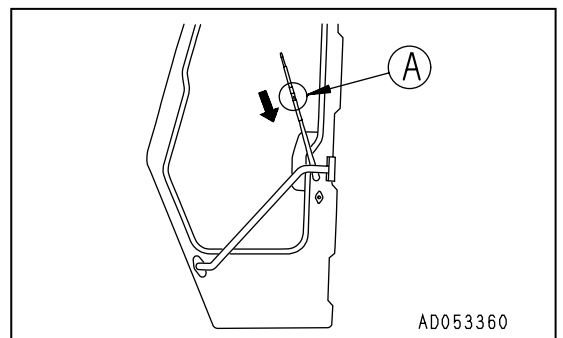
FRONT, REAR WIPER

1. Remove screw(1), then remove the blade.
2. Install a new blade, then tighten screw(1) securely.



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.



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

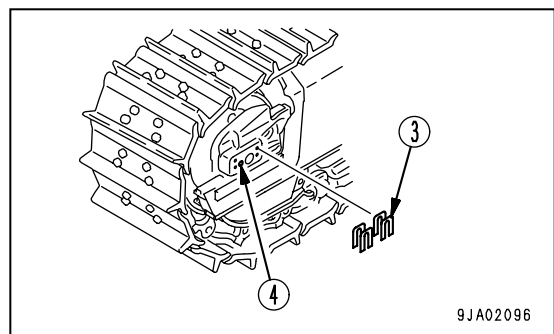
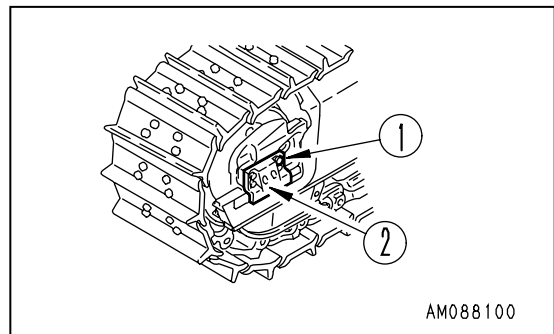
When removing shim(3) keep it in a safe place and be careful not to lose it.

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 repair.
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 was removed in Step 1.

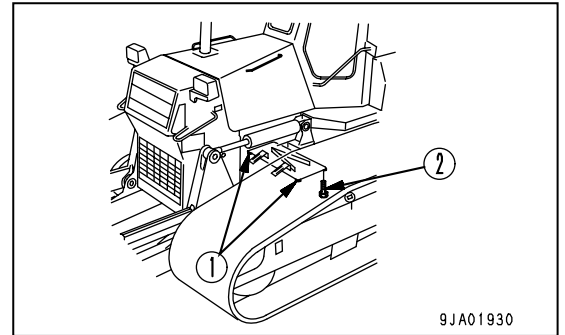
For details of adjusting the shim thickness, see "ADJUST IDLER CLEARANCE (PAGE 4-30)".



CHECK OIL LEVEL IN DAMPER CASE, ADD AND CHANGE OIL

⚠ WARNING

- The oil is very hot just after the operation. Wait until the oil temperature drops, then start the work.
- The undercover is heavy. Do not open or close it just under it. When removing bolt(2), stand after the cover so that you can escape at any moment.
- When removing drain plug(5) of the damper case, take care not to get soaked with oil.

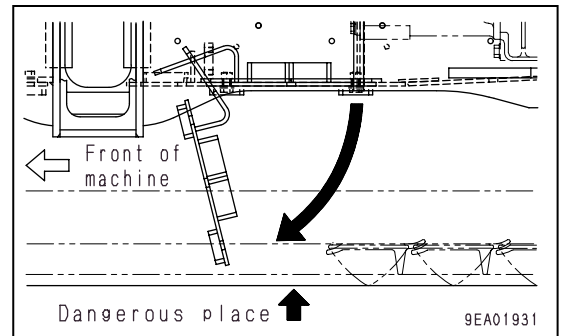


If the quantity of the oil in the damper is insufficient, the damper may be seized. Accordingly, check, and add or replace the oil according to the following procedure.

- At the time of "CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (POWER TRAIN STRAINER, SCAVENGING PUMP STRAINER) (PAGE 4-52)", check the oil in the damper case and add new oil, if necessary, and replace it at the shorter interval of two years (in every other autumn) and 2000 operating hours.

INSPECTION

1. Remove the undercover from the rear bottom of the machine body according to the following procedure.
 - 1) Remove two bolts(1) from the front side of the machine body.
 - 2) Holding the cover, remove two bolts(2) from the rear side of the machine body.
 - 3) Lower and open the cover gradually.
Weight of undercover: 21kg (46lb)

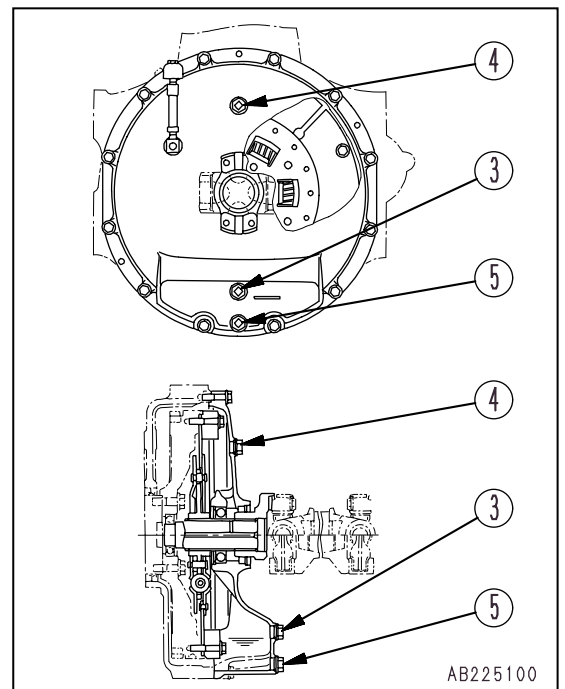


2. Remove oil level plug(3) and check the oil level. The proper oil level is the bottom edge of the plug hole.

Tighten plug(3).

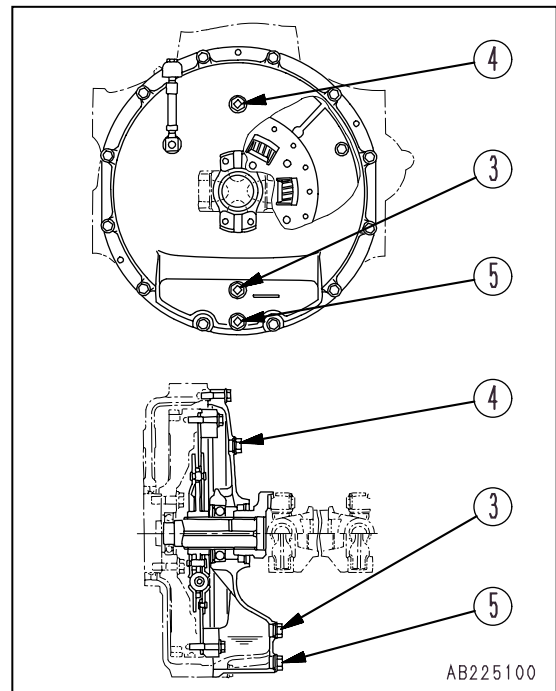
REMARK

- 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.
3. If the oil level is below the bottom edge of the plug hole, remove oil filler plug(4) and add new oil. Add new engine oil until the oil level reaches the bottom edge of oil level plug(3).
 4. After adding the oil, tighten plugs(3) and(4).



REPLACEMENT

- Container of 4 liters or larger to receive drained oil
 - Quantity of replacement oil: 1.3 liters (0.34 US gal)
1. 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).
 2. Add engine 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).
 3. After refilling the oil, tighten plugs(3) and (4).



PROCEDURE FOR BLEEDING AIR OF HYDRAULIC SYSTEM

See "STARTING ENGINE (PAGE 3-54)".

Since the engine must be started and the blade must be operated, see the volume of operation.

NOTICE

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

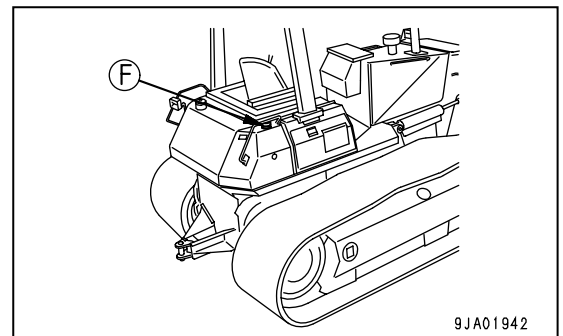
1. Bleeding air from cylinders
 - 1) Run the engine at low idling, and extend and retract each cylinder 4 - 5 times. Do not operate the cylinder to the end of its stroke. (Stop at a point approx. 100 mm before the end of the stroke.)
 - 2) Next, operate each cylinder 3 to 4 times to the end of its stroke.
 - 3) 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. Operate the blade control lever in each direction to the stroke end to release the internal pressure within 15 seconds after the engine is stopped.
4. Loosen oil filler cap (F) at the top of the hydraulic tank slowly to release the internal pressure.



CHECK BEFORE STARTING

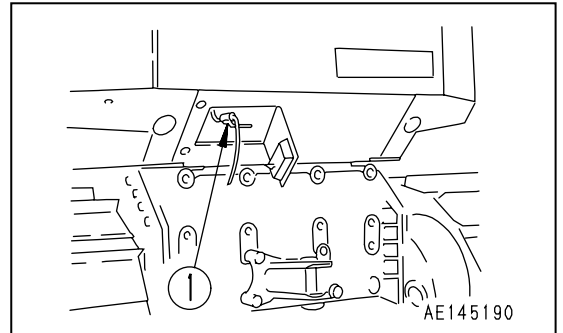
For details of the following items, see "CHECK BEFORE STARTING (PAGE 3-40)" in the OPERATION section.

- Check coolant level, add water
- Checking with machine monitor
- Check speed range display lamp
- Check fuel level, add fuel
- Check oil level in engine oil pan, add oil
- Check oil level in power train case, add oil
- Check brake pedal travel
- Check dust indicator
- Check that lamps light up
- Check horn sound
- Check back-up alarm sound
- Check seat belt for wear or damage
- Check for water and sediment in water separator, drain water (if equipped)

EVERY 50 HOURS SERVICE

DRAIN WATER, SEDIMENT FROM FUEL TANK

1. Drain water and sediment before starting the machine.
2. Prepare a container to receive fuel to be drained.
3. Open drain valve(1) at the bottom of the tank to drain sediment and water accumulated on the bottom, together with fuel.
At this time, take care not pour fuel over yourself.
4. After clear fuel comes out, close drain valve(1).



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)Frame center ball (1 place)



EVERY 250 HOURS SERVICE

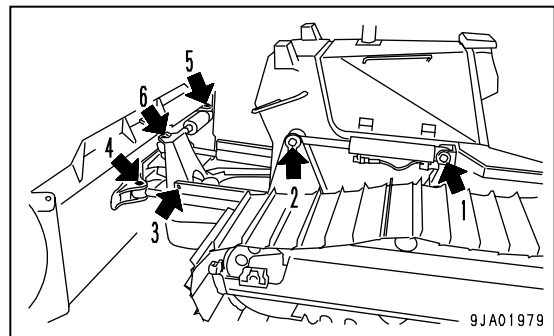
Maintenance for every 50 hours service should be carried out at the same time.

LUBRICATING

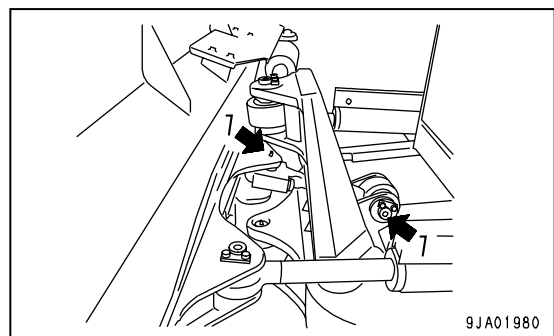
1. Lower the blade to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

POWER ANGLE, POWER TILTDOZER

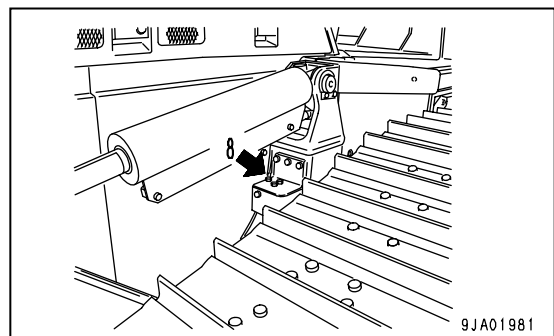
- (1) Lift cylinder bottom pin (2 places)
- (2) Lift cylinder head pin (2 places)
- (3) Angle cylinder bottom pin (2 places)
- (4) Angle cylinder head pin (2 places)
- (5) Tilt cylinder bottom pin (1 place)
- (6) Tilt cylinder head pin (1 place)



- (7) Rod pin (2 places)

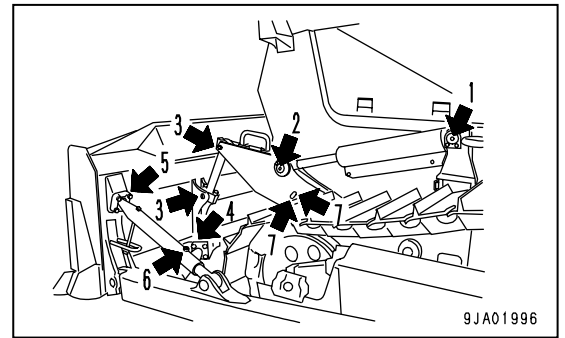


- (8) Frame mounting pin (2 places)

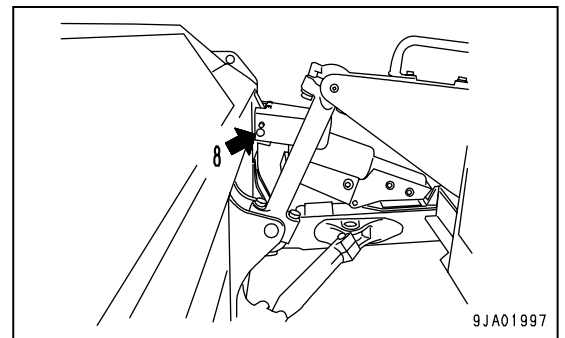


POWER TILTDOZER

- (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)



9JA01996



9JA01997

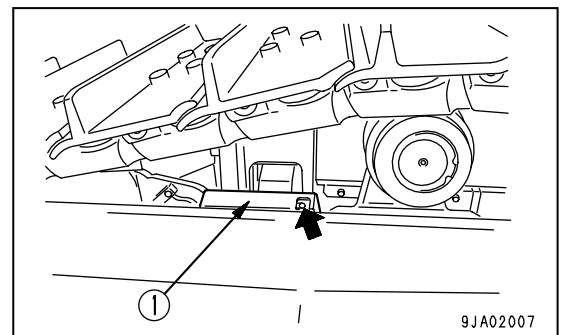
GREASE EQUALIZER BAR SIDE PIN

One place on each side of machine body

1. Remove all dirt from the top of the track frame and cover(1).
2. Clean the grease fitting indicated with the arrow, 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.

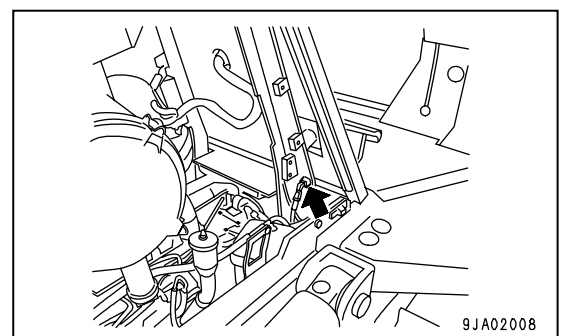


9JA02007

GREASE EQUALIZER BAR CENTER PIN

(1 place)

1. Open the left side cover of the machine body.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.



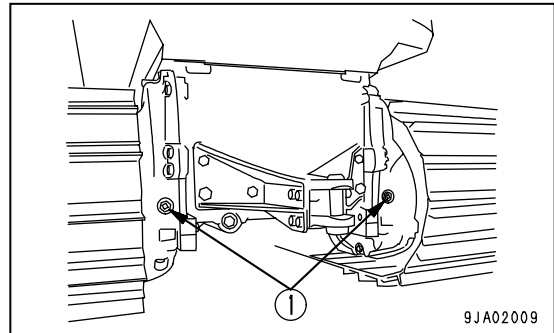
9JA02008

CHECK OIL LEVEL IN FINAL DRIVE 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.

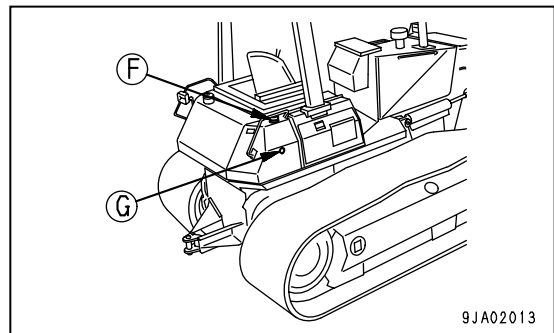
1. Remove oil level plug(1) and check whether the final drive case is filled with oil to lower edge of the plug hole.
2. If the oil level is still too low, add engine oil through the plug hole until the oil overflows.



CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

WARNING

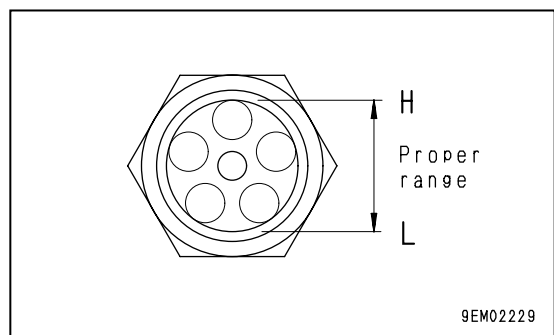
- When removing the oil filler cap, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.
- If oil has been added to above proper range, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug.



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 the blade to the ground, stop the engine and wait for about 5 minutes before checking oil level. If oil level is between H and L in sight gauge(G).
2. If the level is below the L mark, add engine 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

WARNING

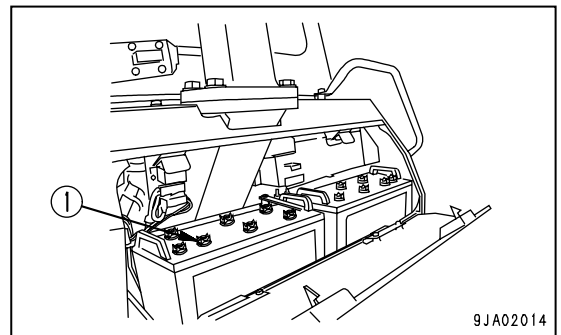
- Since the battery produces combustible gas and can explode, do not bring fire near it.
- Battery fluid is a dangerous substance. Take care that it does not get in your eyes or on skin. If it does, wash it away with a large quantity of water, then see a doctor.
- Do not use or charge the battery when its fluid level is below the LOWER LEVEL. If it is used or charged as it is, it may explode. Be sure to check the battery fluid level periodically and add distilled water to the UPPER LEVEL, as required.

Carry out this check before operating the machine.

1. Open the battery cover on the left side of the machine body.
2. Remove cap (1), and check if the battery electrolyte is up to the UPPER LEVEL line. If the level is low, add distilled water.
Do not add water above the UPPER LEVEL line. This may cause the electrolyte to leak, which may cause fire or injury.

If the electrolyte has spilled, add dilute sulfuric acid.

3. Clean the air hole in the battery cap (3), then tighten the cap securely.
Wipe the top surface of the battery with a damp cloth to keep it clean.



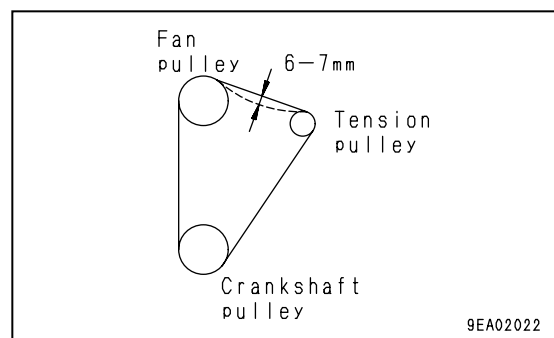
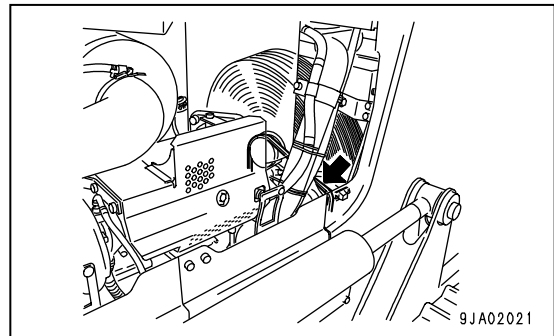
NOTICE

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

CHECK FAN BELT TENSION, ADJUST

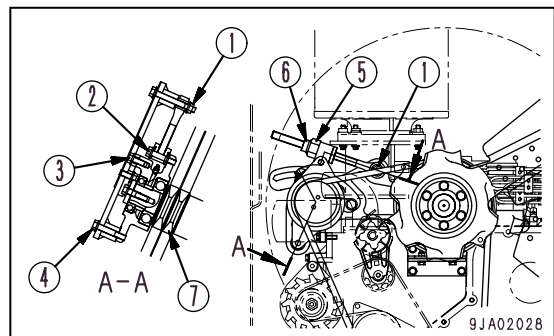
INSPECTION

The belt should normally deflect by 6 to 7mm (0.24 to 0.28in) when pressed with the finger (with a force of approx. 59N (6kgf)) at a point midway between the tension pulley and fan pulley.



ADJUSTMENT

1. Loosen bolts and nuts(1), (2), (3), (4) and (5).
2. Turn nut(6) clockwise, then move tension pulley(7) to adjust the belt tension so that the deflection is about 7mm (0.28in) when pushed with a force of 59N (6kgf).
3. Tighten the bolts and nuts(1), (2), (3), (4) and (5) to fix tension pulley(7) in position.

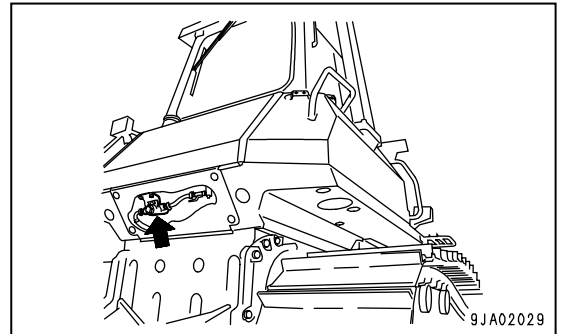


REMARK

- 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.
- If any pulley is defective, ask your Komatsu distributor to replace it.
- If any belt has stretched and there is no allowance for adjustment, or if there are cuts or cracks on any belt, replace both belts at the same time.
- When adjusting the V-belt, do not push the tension pulley directly with a steel bar, etc., but put a wood piece, etc. between the pulley and bar.
- After replacing the V-belt, operate for 1 hour, then check and adjust the belt tension again.
- Special tools are required to replace the flat belt used to drive the alternator and water pump. Ask your Komatsu distributor to replace that belt.

CHECK, CLEAN FUEL STRAINER

1. Open the inspection cover at the bottom of the fuel tank.
2. Tighten the fuel supply valve, then remove the cap, and clean the strainer and strainer case.
The strainer forms one unit with the cap.
3. After checking and cleaning the strainer, set it in the case, then tighten the cap.
4. After installing, open the fuel supply valve.



CHECK BRAKE PERFORMANCE

WARNING

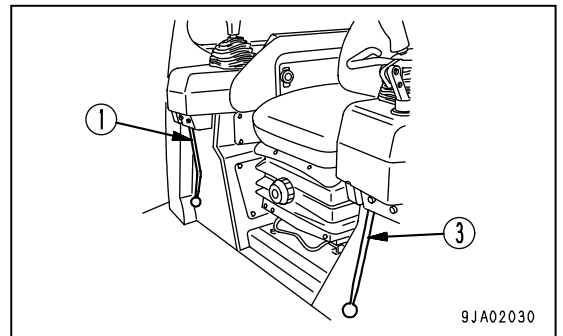
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

NOTICE

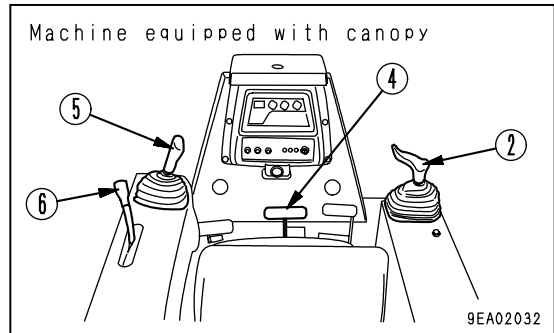
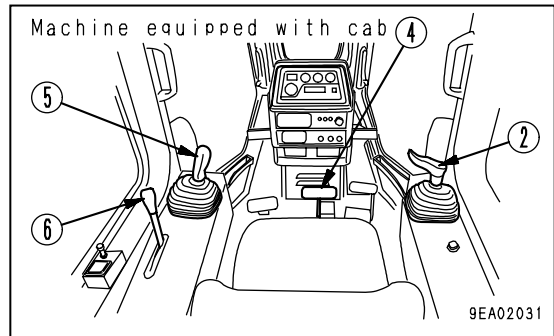
Do not place the gear shift lever in 1st under any circumstances. The machine will be damaged.

Before starting the engine, check that the area around the machine is safe, then do as follows.

1. Start the engine.
2. Set safety lock lever(1) to the FREE position then operate blade control lever(2) to raise the blade.
Leave the safety lock lever to the FREE position.
3. Set brake lock lever(3) to the FREE position.



4. Depress brake pedal(4) and move steering, directional and gear shift lever(5) in 2nd.
5. Operate fuel control lever(6) to raise the engine speed gradually to full throttle.
6. Check that the machine does not move. This indicates that brake performance is normal.



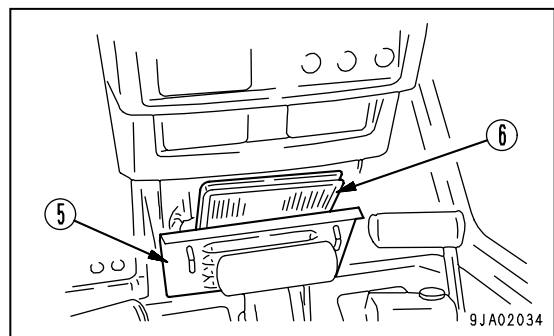
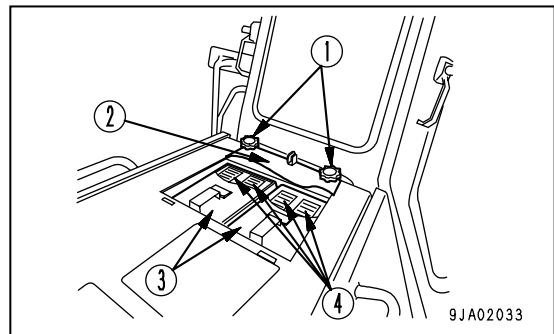
CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER)

(Machine 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) and remove inspection cover(2) and inside covers(3), then remove FRESH filters(4).
2. Remove the filter box, then brush out the dirt accumulated inside the box through the cleaning hole in the hood.
When doing this, be careful not to let any dirt or dust get into the fresh air intake port leading to the cab.
3. Open inspection cover(5) under the front panel, then pull up RECIRC filter(6) and remove it.
4. Clean filters(4) and (6) 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.

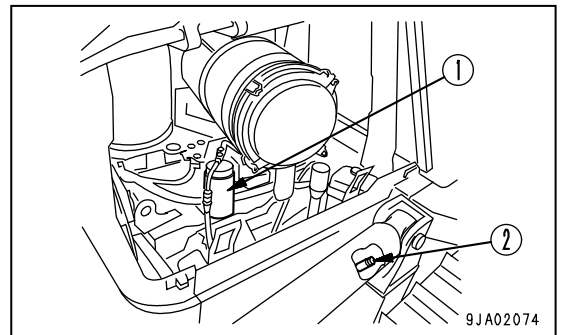
REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

- Engine is at high temperature immediately after the machine has been operated. Wait for 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. Set the container to catch the fuel under the filter cartridge.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. 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.
4. 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.



5. Loosen the knob of feed pump(2) and operate it 50 to 60 times up and down. This will bleed the air.
6. Push in the knob of feed pump(2) and tighten it.
7. 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 - 6 to install the filter cartridge.

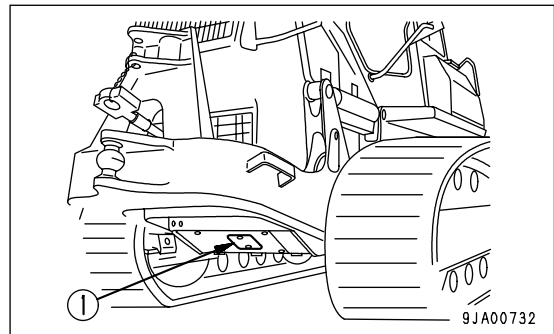
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

WARNING

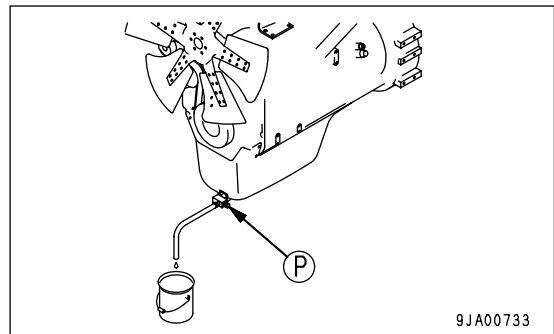
The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.

Wait for the oil to cool down before changing it.

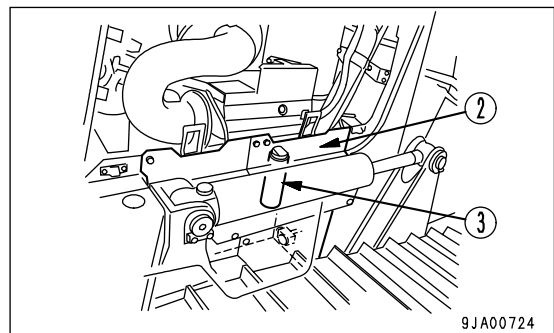
- Refill capacity: 19 liters (10.03 USgal)
 - Socket wrench, filter wrench.
1. Remove inspection cover (1) at the front of the machine.



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. Install 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.

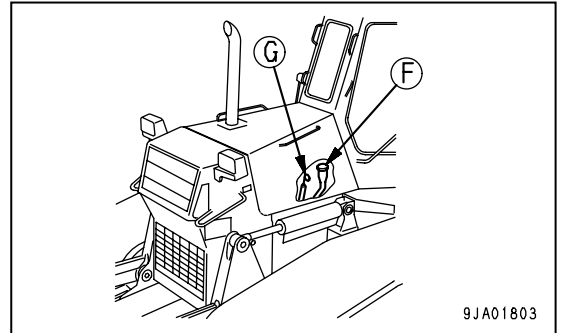


When doing this, to prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.

In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.

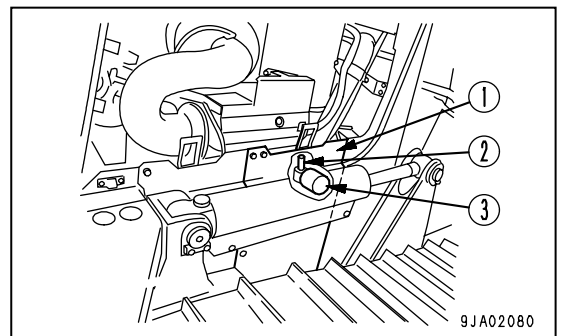
7. Clean the filter holder, fill the new filter cartridge with engine oil, coat the packing surface and thread with engine oil (or coat it thinly with grease), then install the filter cartridge.
8. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 to 1 turn.

9. After replacing the filter cartridge, add engine oil through oil filler (F) until the oil level is between the H and L marks on the 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 (PAGE 3-44)".



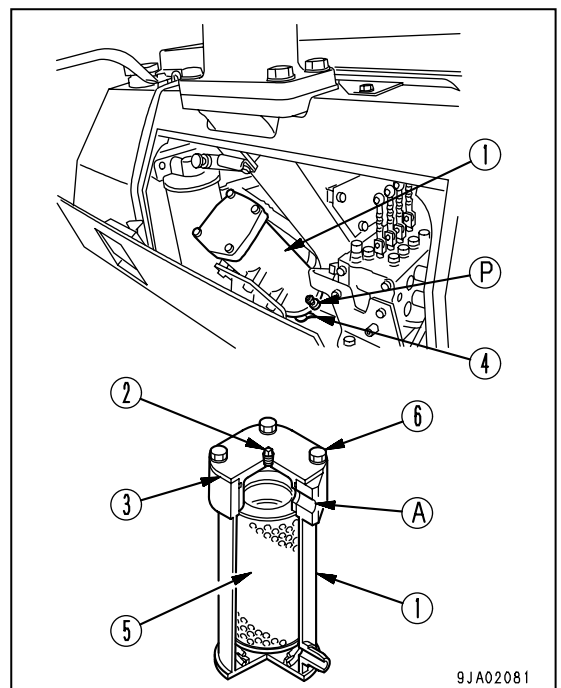
REPLACE CORROSION RESISTOR CARTRIDGE

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, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 2/3 of a turn.
6. Open valve (1).
Use Komatsu genuine cartridge.



REPLACE POWER TRAIN OIL FILTER ELEMENT

1. Open cover at 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.

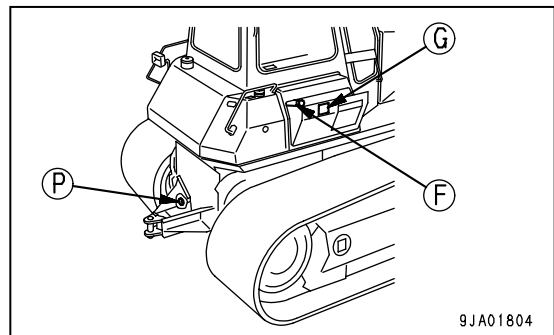
CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (POWER TRAIN STRAINER, SCAVENGING PUMP STRAINER)

⚠ WARNING

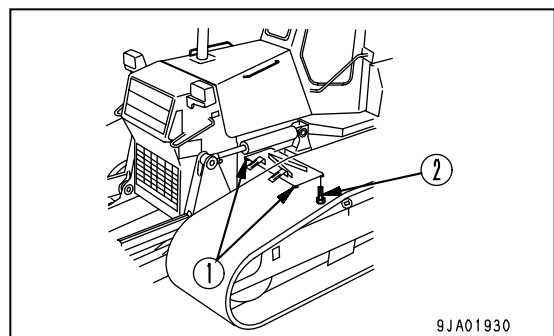
- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear below the cover so that you can easily get out of the way.

- Container to catch drained oil: Min 50 liters capacity
- Refill capacity: 50 liters (13.2US gal)

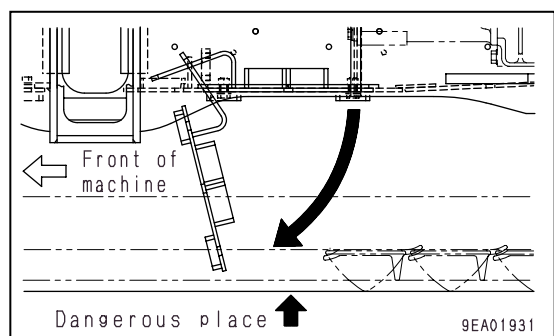
1. Loosen drain plug(P) (with a slit), drain the oil, then tighten drain plug(P) again.
Do not remove drain plug(P).



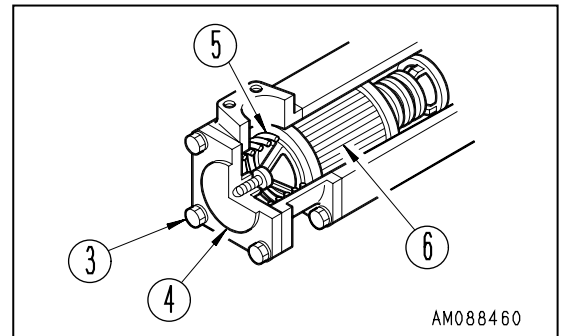
2. Remove the undercover from the rear bottom of the machine body according to the following procedure.
 - 1) Remove two bolts(1) from the front side of the machine body.
 - 2) Holding the cover, remove two bolts(2) from the rear side of the machine body.



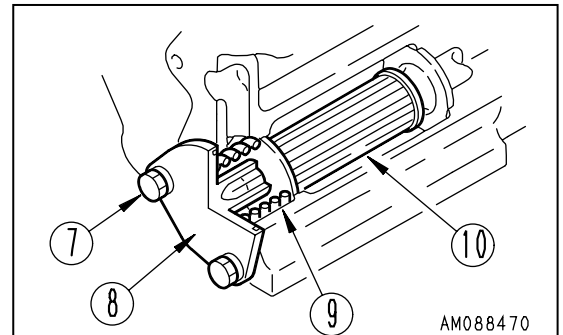
- 3) Lower and open the cover gradually.
Weight of undercover: 21kg (46lb)



3. Loosen mounting bolt(3) of the power train strainer, then remove cover(4).
4. Take out spring(5), then take out strainer(6).
5. Remove all dirt from strainer(6), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.

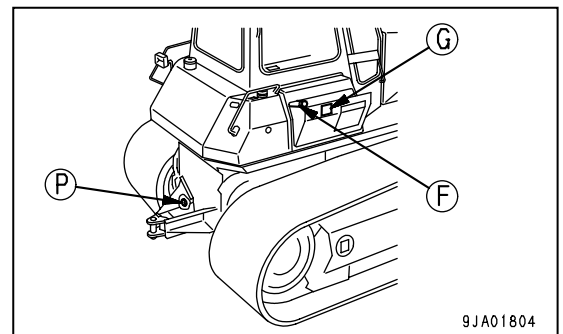


6. Loosen mounting bolt(7) of the scavenging pump strainer, then remove cover(8).
7. Take out spring(9), then take out strainer(10).
8. Remove all dirt from strainer(10), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.



9. Install the strainers to their original position.
10. After installing, replace the element in the power train oil filter. For details, see "REPLACE POWER TRAIN OIL FILTER ELEMENT (PAGE 4-51)".

11. Open cover at the right side of the machine.
12. Refill the specified quantity of engine oil through oil filler(F).
13. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL (PAGE 3-45)".
If the spring or strainer are damaged, replace them.



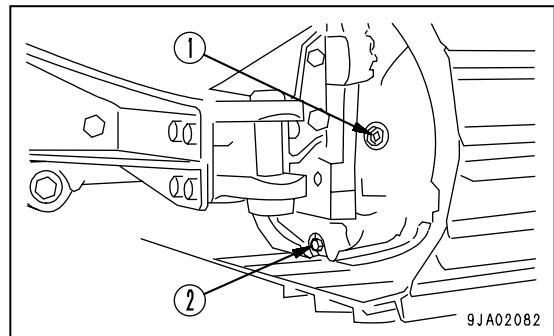
14. Close the cover at right side of machine.

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.

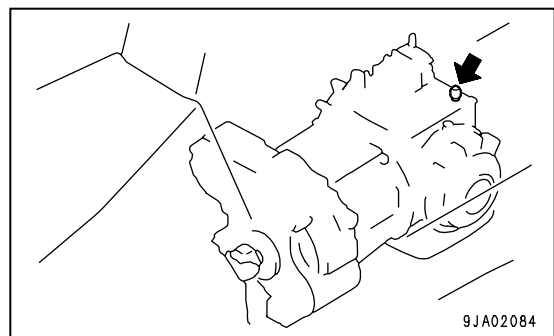
- Container to catch drained oil: Min. 27 liters capacity
 - Refill capacity:
D61EX: (each) 24 liters (6.34US gal)
D61PX: (each) 27 liters (7.13US gal)
1. Remove oil level plug(1) , then remove drain plugs(2), and drain the oil. After draining the oil, tighten the plugs.
 2. Add engine oil to the specified 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 (PAGE 4-44)".



CLEAN BREATHER

1. Remove the rear cover.
2. Remove the breather and wash out dust remaining inside with diesel oil and flushing oil.

Power train case breather (1 place)



GREASE UNIVERSAL JOINT

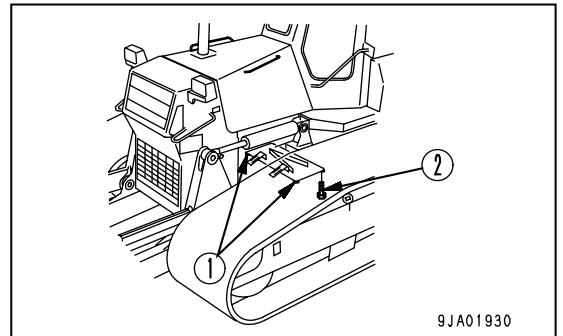
⚠ WARNING

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 below the cover so that you can easily get out of the way.

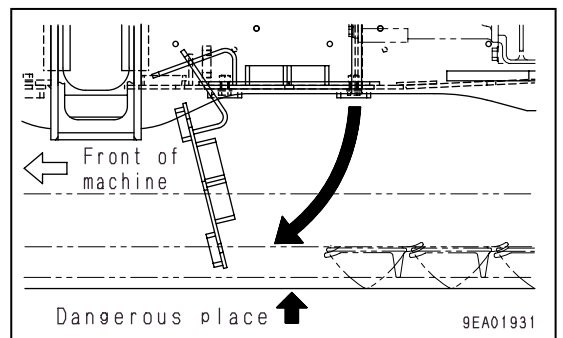
Apply grease to the grease fittings (2 places) shown by arrows.

Remove the undercover at the rear bottom of the chassis as follows.

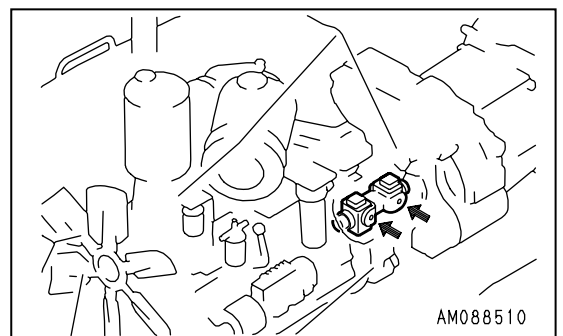
1. Remove 2 bolts(1) at the front of the machine.
2. Support the cover with your elbow while gradually removing 2 bolts(2) at the rear of the machine.



3. Lower the cover gradually to open it.
Weight of undercover: 21kg (46lb)



4. Apply grease to the grease fittings (2 places) shown by arrows.



CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Please contact your Komatsu distributor to have the tightening portions checked.

CHECK PLAY OF TURBOCHARGER ROTOR

Please contact your Komatsu distributor to have the rotor play checked.

CHECK FOR LOOSE ROPS MOUNT BOLTS

(If equipped)

Check for loose and damaged bolts.

If any loose bolt is found, tighten to a torque of $927 \pm 103\text{N}\cdot\text{m}$ ($94.5 \pm 10.5\text{kgf}\cdot\text{m}$, $684 \pm 76\text{lbft}$)

If any damaged bolt is found, replace the bolt with a genuine Komatsu bolt.

EVERY 2000 HOURS SERVICE

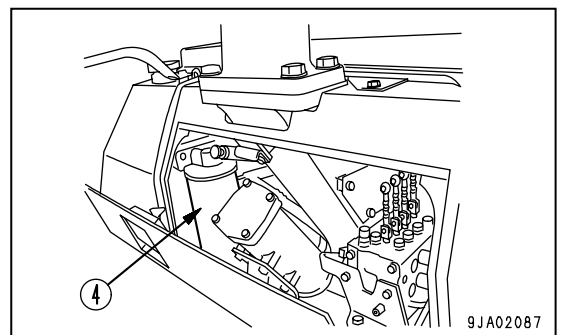
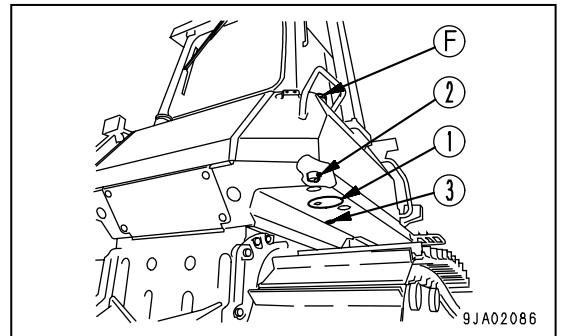
Maintenance for every 50, 250, 500 and 1000 hours service should be carried out at the same time.

CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT AND CLEAN SUCTION STRAINER

⚠ 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 cleaning the hydraulic tank strainer.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure, then remove it carefully.

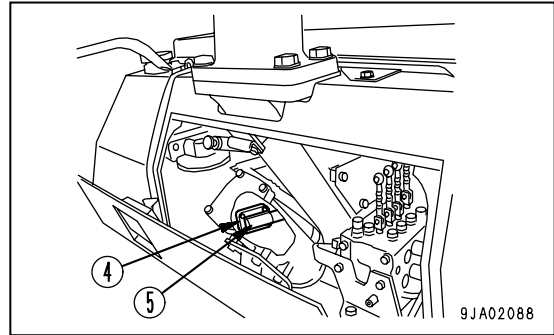
- Container to catch drained oil: Min. 44 liters capacity
 - Refill capacity: 44 liters (11.62US gal)
1. Lower the blade on the ground securely, stop the engine and slowly turn the cap of oil filler(F) to release the internal pressure. Then, remove the cap.
 2. Remove the cover(1) at the bottom of the hydraulic tank.
 3. Place a container to receive drained oil on the track under the drain hole.
 4. Loosen drain valve(2) at lower side of hydraulic tank to drain the oil, then tighten valve(2) again. When loosening drain valve(2), be careful not to get the oil on you.
 5. Remove grommet(3) on the underside of the fender and place a container to receive drained oil on the track under the drain hole.
 6. Open cover at the right side of the machine.
 7. Using the filter wrench, turn filter cartridge(4) counter-clockwise to remove it.



8. Remove bolts(4) (4 pieces) and lift up the flange of pipe(5).

REMARK

Lift up the flange to take out the strainer. Turn the flange by utilizing the slack of the rubber hose connected to the pipe.



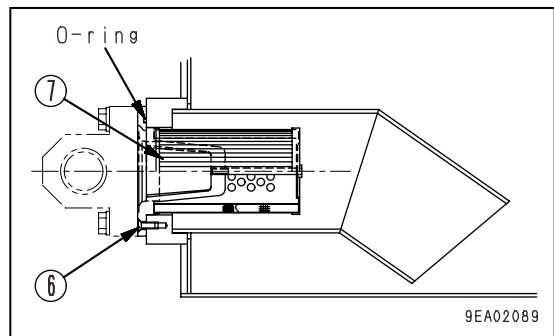
9. Remove screws(6) (2 pieces) and pull out strainer(7).

10. Remove dirt from strainer(7), then wash the strainer in clean fuel oil or cleaning oil.

11. Install strainer(7) and secure it with screws(6), then install pipe(5) with bolts(4).

12. Install grommet(3).

13. Clean the filter holder and fill the new filter cartridge with clean engine oil. Apply clean engine oil (or apply grease thinly) to the packings and threads of the new filter cartridge, then install it.



14. After the packing surface of the cartridge touches the sealing surface of the filter holder, tighten the cartridge further by about 2/3 turns.

Use Komatsu genuine cartridge.

15. Refill the specified quantity of engine oil through oil filler(F).

16. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-44)".

17. Close the cover at right side of machine.

CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning or 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 brush may be worn or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, have this inspection carried out every 1000 hours.

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.

MEMO

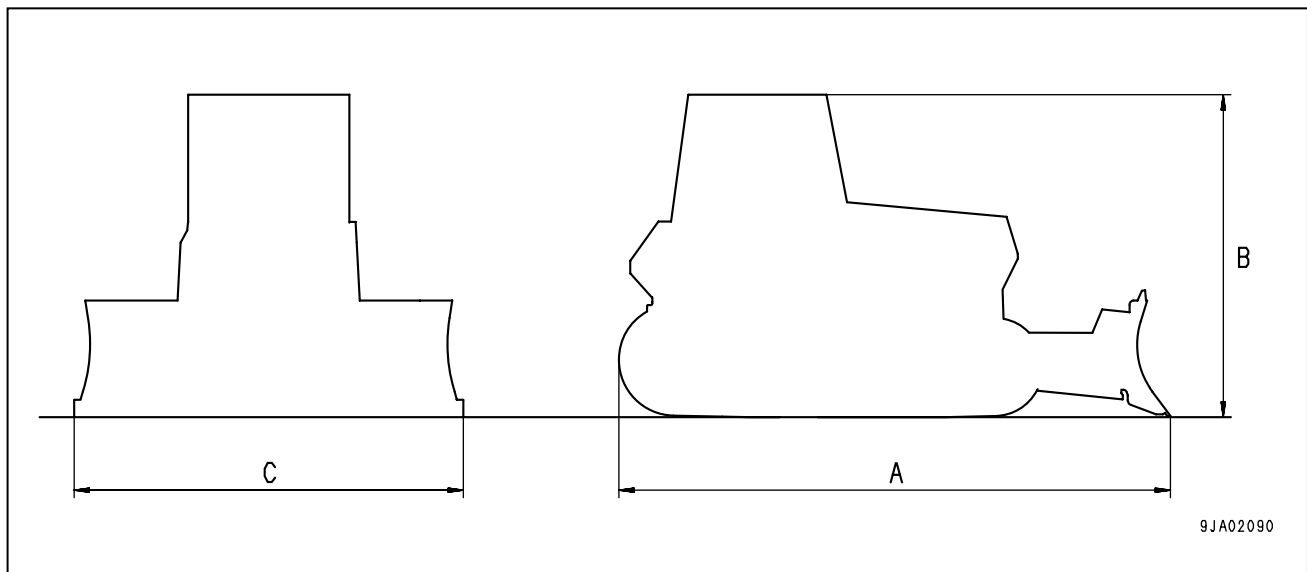
SPECIFICATIONS

SPECIFICATIONS

D61EX-12 Power angle, power tiltdozer with ROPS canopy

D61PX-12 Power angle, power tiltdozer with ROPS canopy (equipped with single shoe)

Item		Unit	D61EX-12	D61PX-12
Operating weight (without operator)		kg(lb)	15,800(34,839)	17,500(38,588)
Name of engine		—	Komatsu S6D114E-1A deisel engine	
Engine horsepower		Kw{HP}/rpm	110.33{148}/1,850	
A	Overall length	mm(ft in)	5,030(16'6")	5,465(17'11")
B	Overall height	mm(ft in)	3,115(10'3")	3,140(10'4")
C	Overall width	mm(ft in)	3,275(10'9")	3,860(12'8")
Travel speed (1st/2nd/3rd)	Forward	km/h(MPH)	3.5/6.0/10.3(2.2/3.7/6.4)	
	Reverse	km/h(MPH)	4.6/7.9/12.8(2.9/4.9/8.0)	



ATTACHMENTS, OPTIONS

 **WARNING**

Please read and make sure that you understand the safety volume 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

- Attachments are strong tools. Handle them correctly to prevent serious injury.
- Read the operation manual for each attachment carefully, and do not use the machine before you understand the operation method completely.
If you lose your operation manual, be sure to order another copy from the manufacturer or your Komatsu distributor.
- Place your foot on a pedal only when necessary for prevention of serious injury caused by malfunction.

Precautions for removal and installation

When removing or installing an attachment, observe the following items and work safely.

- Install or remove an attachment on a level and hard place.
- When working by two persons or more in cooperation, decide signs and work according to them.
- When carrying a heavy part (25kg (55lb) or heavier), use a crane.
- When removing a heavy part, be sure to prepare a support for it in advance.
When removing it with a crane, take care of its center of gravity particularly.
- It is dangerous to work on a part lifted up with a crane. Be sure to place the part on a stand and check safety.
- When leaving a attachment removed or installing it, place it in a stable position.
- Do not stand under a part lifted up with a crane.
Stay a place apart from the part where your are safe even if the part falls.

NOTICE

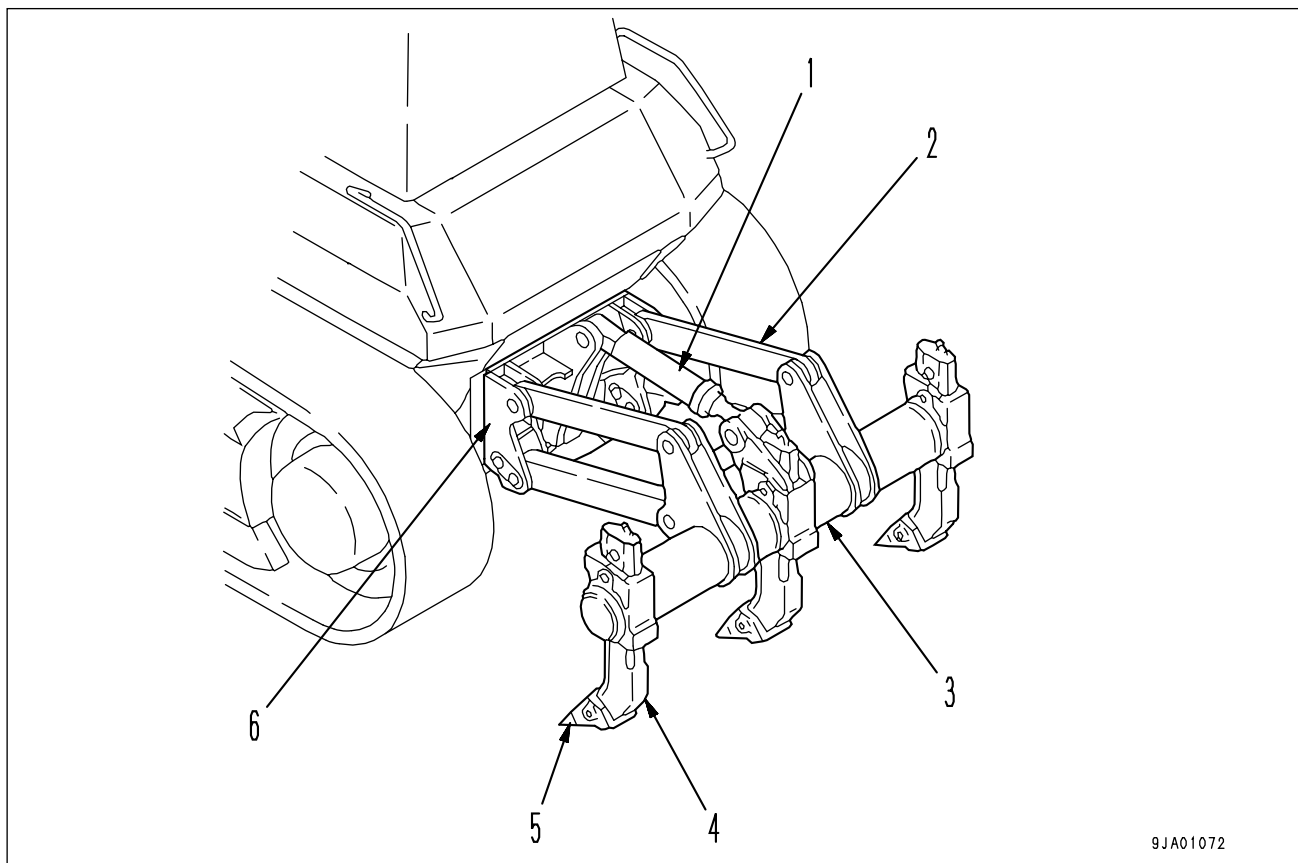
Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

HANDLING HYDRAULIC RIPPER

- This ripper is for the D61EX-12.
- When installing it to the D61PX-12, change the track shoe to the 600 mm (23.6 in) narrow single shoe. If the ripper is installed to machines with wider track shoes, the undercarriage may be damaged.

GENERAL VIEW



(1) Hydraulic cylinder

(2) Link

(3) Beam

(4) Shank

(5) Point

(6) Support

EXPLANATION OF COMPONENTS

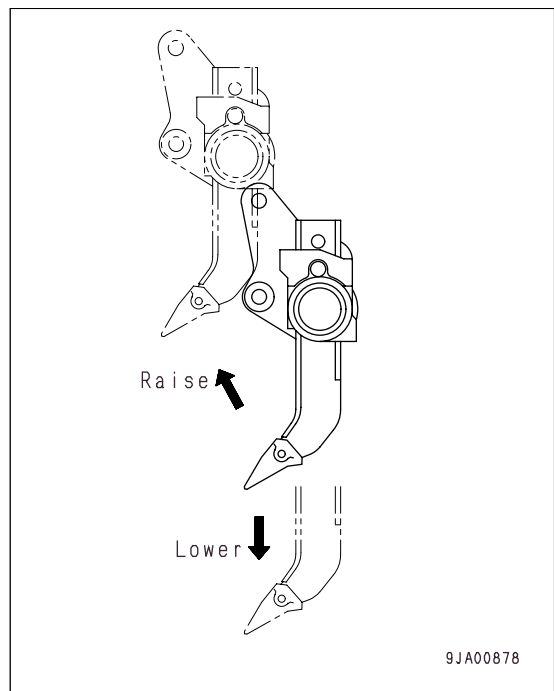
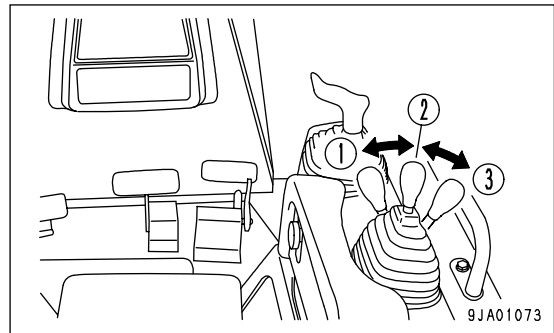
RIPPER CONTROL LEVER

⚠ WARNING

When carrying out inspection or maintenance of the machine, or when parking the machine, lower the ripper to the ground and set the safety lock lever to the LOCK position.

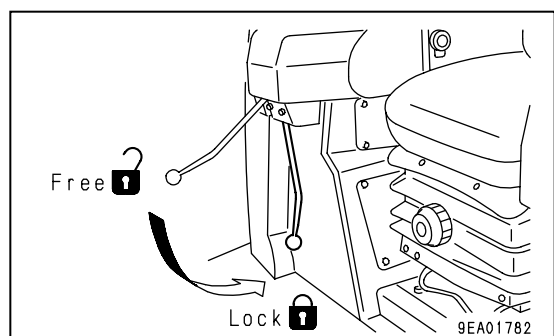
This lever is used to operate the ripper.

- (1) RAISE: The ripper is raised
- (2) HOLD: The ripper is held at the same position.
- (3) LOWER: The ripper is lowered



REMARK

The ripper operation is locked by the safety lock lever. For details of the operation of the safety lock lever, see "SAFETY LEVER (FOR BLADE CONTROL LEVER) (PAGE 3-19)".



OPERATION

INSPECTION AND ADJUSTMENT BEFORE STARTING ENGINE

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

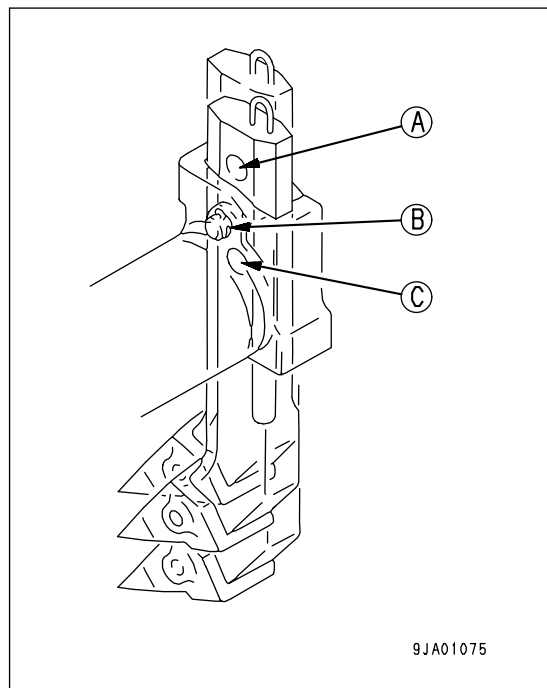
- Travel in low speed and lower the ripper gradually when starting to move the machine off. When the optimum digging depth is reached, move the control lever to the HOLD position. Do not dig the shank in deep when starting digging operations.
- During ripping operations, never turn the machine suddenly 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.

ADJUSTMENT OF WORK EQUIPMENT

ADJUSTMENT OF DIGGING DEPTH

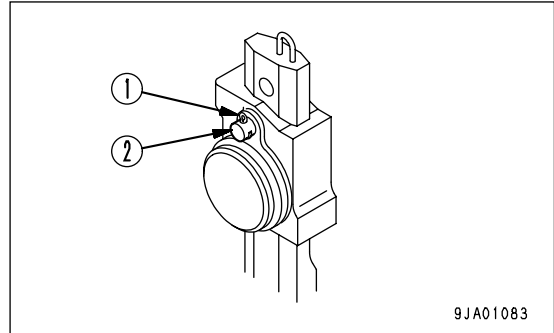
There are mounting holes for the pin in the shank. Select the mounting hole to match the digging depth.

Pin hole position	Use	Max. digging depth
(A)	When there is special need to dig deeply	665mm (2'22")
(B)	Normal operations	555mm (2'22")
(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

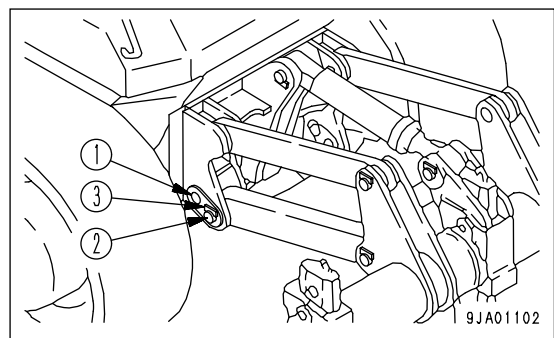
Adjust the position of the mounting pin hole in the beam and upper link.

- Digging angle

Position (1): 45°

Position (2): 55°

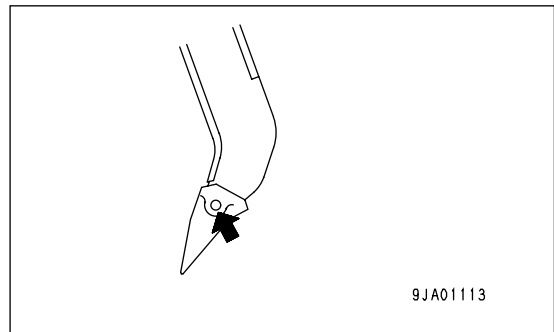
The pin is locked with lock plate (3).



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 abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs..

Problem	Main causes	Remedy
Lamp glows dimly even when engine is running at maximum speed	<ul style="list-style-type: none"> ● Improper hydraulic oil ● Defective pump ● Defective adjustment of relief valve ● Defective control valve, safety-valve <ul style="list-style-type: none"> ● Defective valve spool ● Defective piston ring, packing, valve ● Clogging inside piping 	<ul style="list-style-type: none"> ● Add oil to specified level, see EVERY 250 HOURS SERVICE (● Check, repair) (● Check, repair) (● Check, repair) (● Check, repair) (● Check, repair)
Cylinder lacks holding power	<ul style="list-style-type: none"> ● Leakage of oil from piping, hose ● Defective piston ring, packing ● Defective piston valve ● Defective valve spool ● Defective safety valve, suction valve 	<ul style="list-style-type: none"> ● Tighten (● Replace) (● Check, repair) (● Check, repair) (● Check, repair)
Oil pressure does not rise	<ul style="list-style-type: none"> ● Clogging inside piping ● Defective adjustment of relief valve 	<ul style="list-style-type: none"> (● Replace) (● Check, repair)

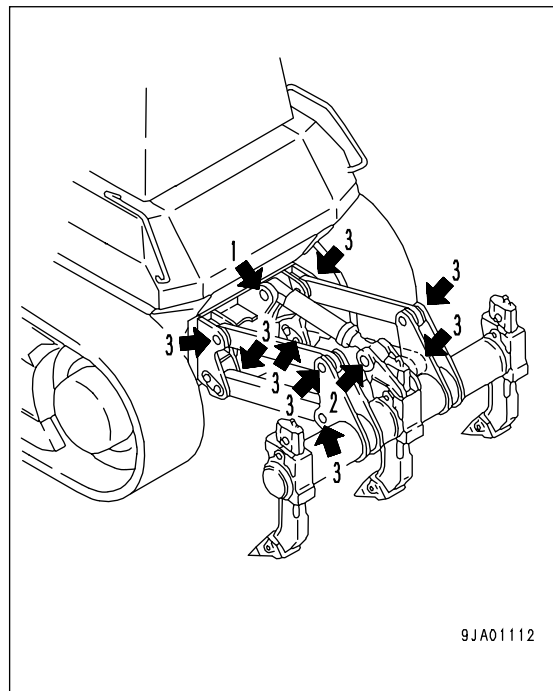
INSPECTION AND MAINTENANCE

EVERY 250 HOURS SERVICE

GREASING

1. Lower the ripper to the ground and stop the engine.
2. Using a grease pump, pump in grease through the grease fittings marked by arrows.
3. After greasing, wipe off all the old grease that has been pushed out.

- (1) Ripper cylinder foot pin (1 point)
- (2) Ripper cylinder rod end pin (1 point)
- (3) Link pin (8 points)



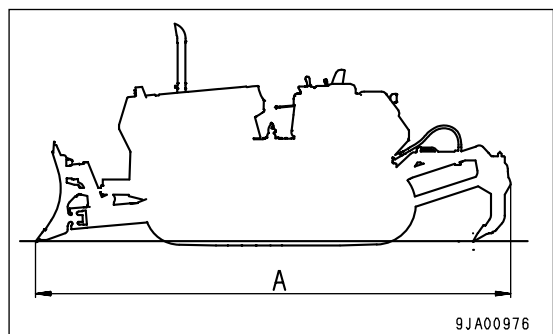
CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

1. Stop the machine on level ground.
Set the blade perpendicular and lower it to 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 (PAGE 4-44)"

SPECIFICATIONS

- Power angle, power tilt dozer

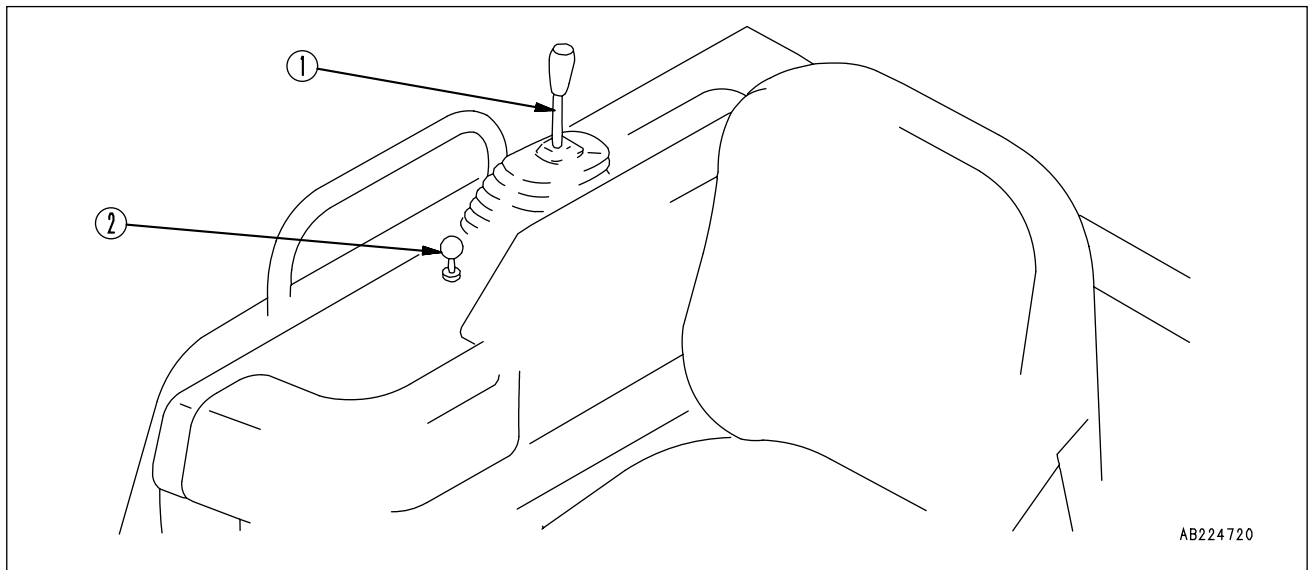
	Item	Unit	D61EX-12
	Operating weight (not including operator)	kg (lb)	17,120 (37,750)
	Weight of ripper as individual part	kg (lb)	1,610 (3,550)
(A)	Overall length	mm (ft in)	6,285 (20'7")
	No. of shanks		3



HANDLING TOWING WINCH

- This winch is for the D61EX-12.
- When installing it to the D61PX-12, change the track shoe to the 600 mm (23.6 in) narrow single shoe. If the winch is installed to machines with wider track shoes, the undercarriage may be damaged.

EXPLANATION OF COMPONENTS



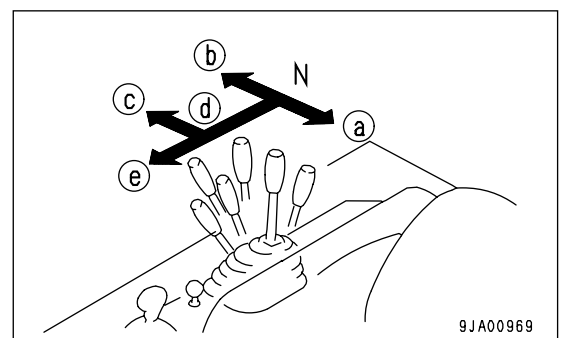
(1) Winch control lever

(2) Safety lock (for winch)

WINCH CONTROL LEVER

This lever (1) is used to operate the winch.

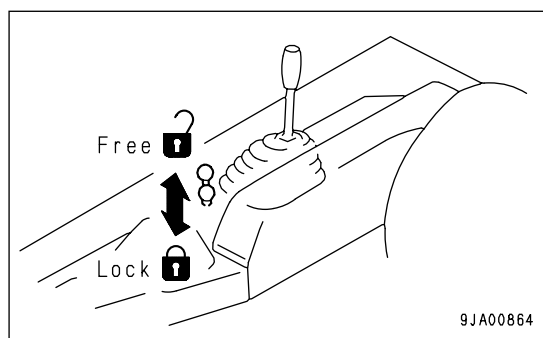
- (a) Normal rotation: Winch winds in
- (b) Reverse rotation: Winch winds out
- (c) Slow reverse rotation: Winch winds out slowly
- (d) Inching: Brake is partially applied
- (e) HOLD: Brake is released
- N (Neutral): Brake is locked



SAFETY LOCK (FOR WINCH)

This lock (2) is used to lock the winch.

When it is moved to the LOCK position, the winch control lever is locked.

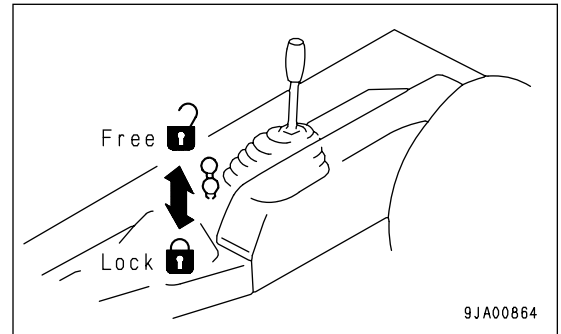


OPERATION

WARNING

Injury or death could result if the control lever is operated incorrectly during winch operations, so always do as follows.

- Do not operate in a different way from the method given in this manual.
- Always wear leather gloves when handling wire rope.
- Do not bring objects that can be caught up in the winch near any rotating part; be careful not to get caught up in the drum when it is rotating.
- When carrying out the winch operation with another worker, agree on signals before starting the operation.
- Do not use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). Always replace with a new wire rope.
- Except when operating the winch, always set the safety lock lever to the LOCK position to lock the winch control lever.
- Always stop the machine before operating the winch, except when releasing the brake.
- When moving the machine, always set the winch control lever to neutral, then set the safety lock lever to the LOCK position to lock the winch control lever.



INSPECTION AND ADJUSTMENT BEFORE STARTING ENGINE

WALK-AROUND CHECK

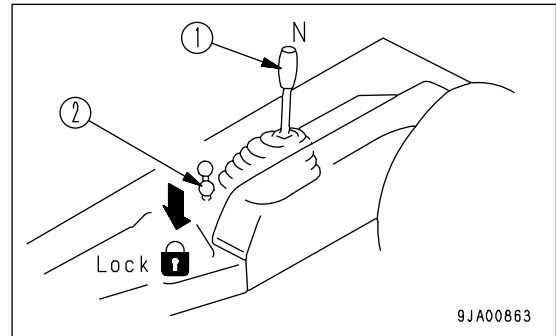
1. Check wire rope

If any abnormality is found, replace the wire rope.

OPERATIONS AND CHECKS BEFORE STARTING ENGINE

Before starting the engine, check the position of every lever.

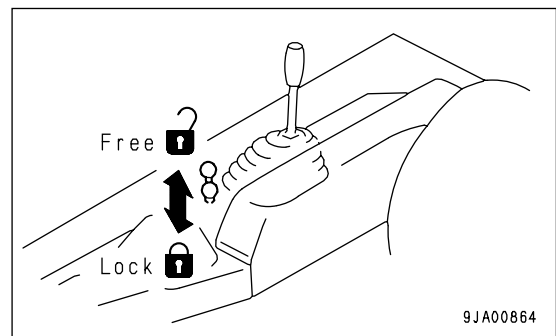
- Check that winch lever (1) is at the N position.
- Check that safety lock lever (for winch) (2) is at the LOCK position.



OPERATION

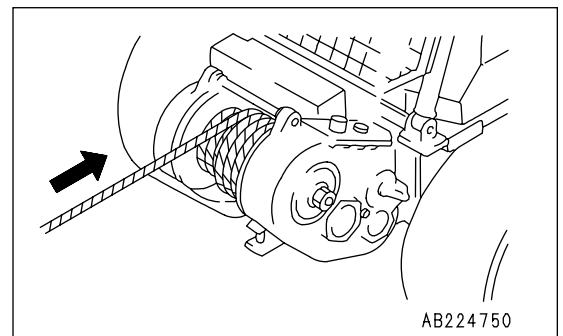
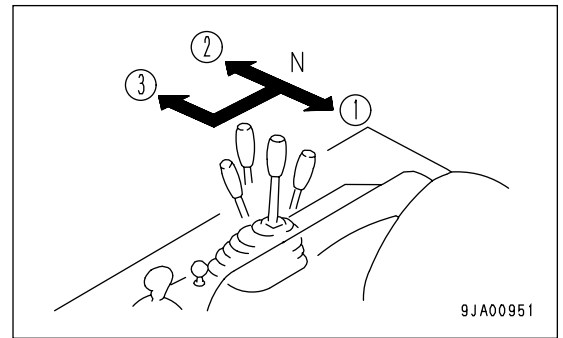
The over-winding method is used with the towing winch: the wire rope is wound in and out from the top of the drum.

1. After starting the engine, set the safety lock lever (for winch) to the FREE position and release the winch control lever from the LOCK position.

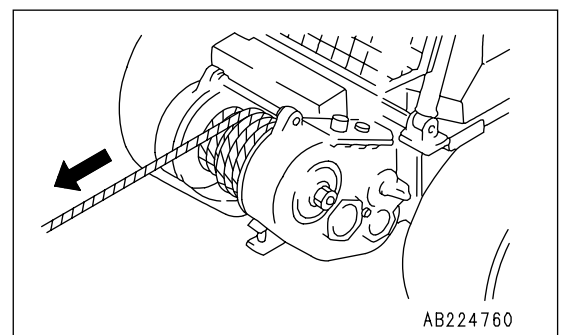
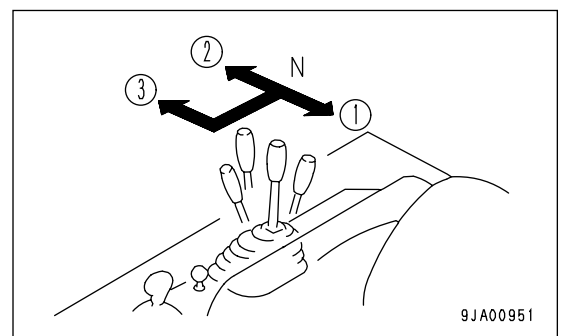


WINDING IN

1. When the winch control lever is moved from the N position to Normal rotation position (1), the brake is released and the wire rope is wound in.
2. When stopping the winding-in operation, release the winch control lever. The lever is returned to the N position and the free brake is applied to stop the winding in of the wire rope.

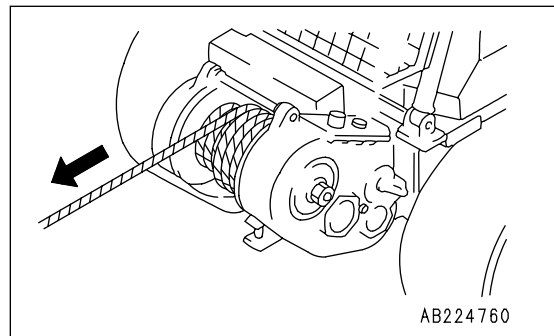
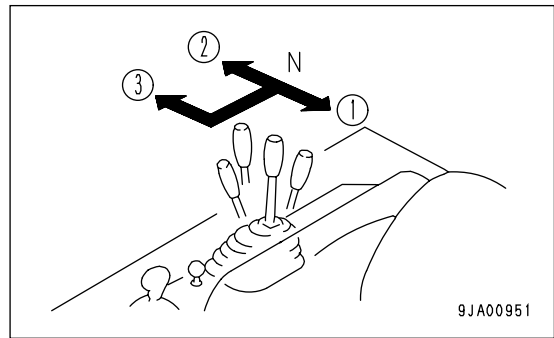
**WINDING OUT**

1. When the winch control lever is moved from the N position to Reverse rotation position (2), the brake is released, the drum rotates in reverse, and the wire rope is wound out.
2. When stopping the winding-out operation, release the winch control lever. The lever is returned to the N position and the free brake is applied to stop the winding out of the wire rope.



SLOW WINDING OUT

1. 1. When the winch control lever is moved from the N position to Slow reverse rotation position (3), the brake is released, the drum rotates slowly in reverse, and the wire rope is wound out.
2. 2. When stopping the slow winding-out operation, release the winch control lever. The lever is returned to the N position and the free brake is applied to stop the winding out of the wire rope.

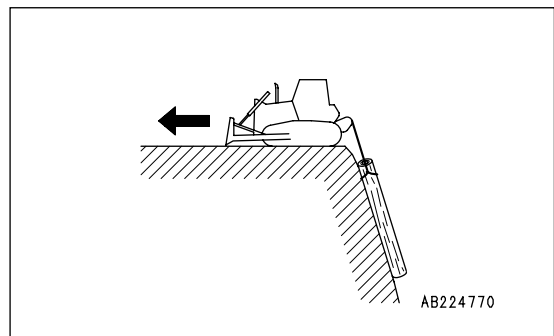


INCHING (BRAKE PARTIALLY APPLIED)

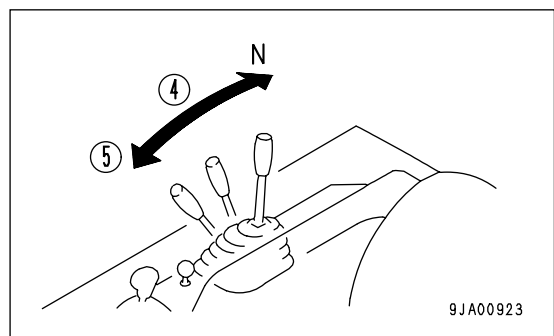
⚠ WARNING

If the winch control lever is pushed fully forward, it will enter FLOAT position (5), be held by the notch, and the brake will be kept fully released. This is dangerous, so do not push the lever fully; if it catches in the notch, pull it back by hand.

Use this operation when driving the machine forward without changing the position of the load hanging from the wire rope, or when lowering the load under its own weight.



1. 1. When the winch control lever is moved from the N position towards position (4), the braking force on the drum is gradually reduced. Adjust the position of the control lever to match the weight of the load or the travel speed of the machine. If the lever is pushed too far forward, there is danger that the load will drop.
2. 2. When stopping the inching operation, release the winch control lever. The lever is returned to the N position and the free brake is applied to stop the inching of the wire rope.



FLOAT (BRAKE RELEASED)

WARNING

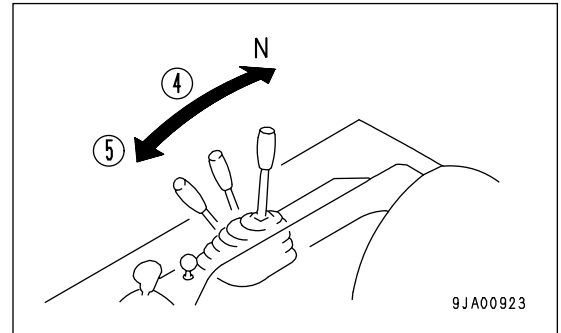
When removing or installing the wire rope, always wear thick leather working gloves.

When winding out the wire rope under external force, do as follows.

1. When the winch control lever is moved fully forward from the N position, it catches in the notch and is held in the FLOAT position. When this happens, the braking force on the drum is completely removed. To return the lever, pull it by hand.
2. This operation enables the wire rope to be wound out under external force.

REMARK

Even when the lever is at the FLOAT (BRAKE RELEASED) position, the wire rope cannot be pulled by human force.



ADJUSTING

ADJUSTING CLUTCH

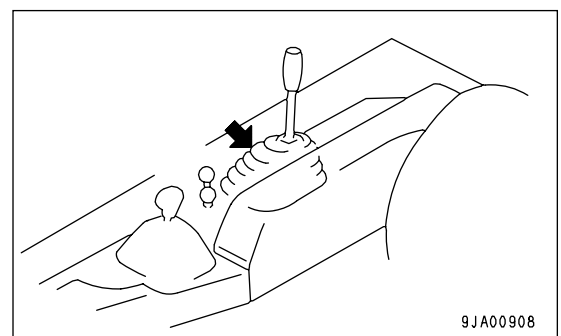
If any abnormality is found, please contact your Komatsu distributor for inspection and repairs.

ADJUSTING BRAKE

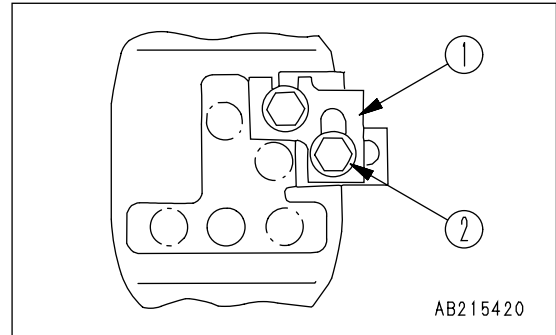
If the wire rope can be wound out from the drum when the winch control lever is at the N position, the brake is not working, so please contact your Komatsu distributor for inspection and repairs.

ADJUSTING SLOW WINDING-OUT SPEED

1. Turn up the boot of the winch control lever.



2. Loosen bolt (2).
3. Watch the rotation of the drum and move adjustment plate (1) to the optimum position. After adjusting, tighten bolt (2) to hold the adjustment plate in position.



HANDLING WIRE ROPE

If the wire rope is repeatedly tensed and slackened, it will rapidly become damaged, so check it for damage before and after operations, and replace it if it is in the following condition.

- Wire rope with marked loss of shape, broken strands, or corrosion.
- Wire rope that is twisted and has kinks.
- Wire rope where the nominal diameter is worn more than 7%.

REMARK

When replacing the wire rope, use a normal Z-lay seal type 19 wire, 6 strand lay 7 x 7 + 6 x S (19) core I.W.R.C.

SERVICE PROCEDURE

INITIAL 250 HOURS SERVICE

Carry out the following maintenance after operating a new machine for the first 250 hours.

- Change gear case oil and clean strainer

For details, see EVERY 1000 HOURS SERVICE.

EVERY 1000 HOURS SERVICE

CHANGE GEAR CASE OIL AND CLEAN STRAINER

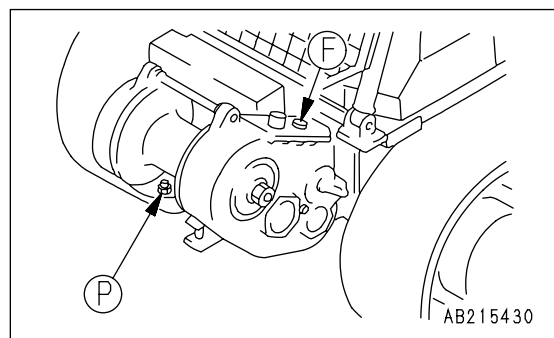
⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

Prepare the following.

- Container to catch drained oil: Min. 76 liters (20.06 US gal) capacity
- Refill capacity: 76 liters (20.06 US gal)

1. Set the container to catch the oil immediately under drain plug (P).
2. Loosen drain plug (P), drain the oil, then tighten drain plug (P) again.



3. Remove strainer cover (H), then take out strainer (J) and case (K) and clean them.

NOTICE

After washing the strainer with flushing oil, blow it with compressed air to completely remove all the dirt.

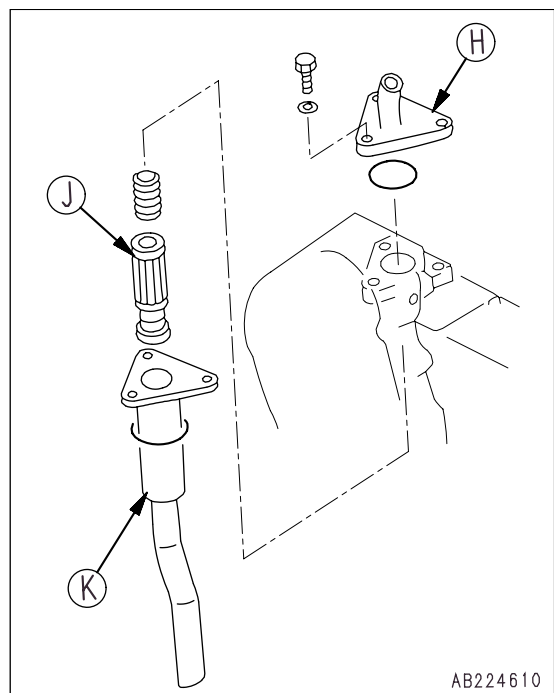
4. Install strainer (J), case (K), and strainer cover (H), then add engine oil through oil filler (F).

NOTICE

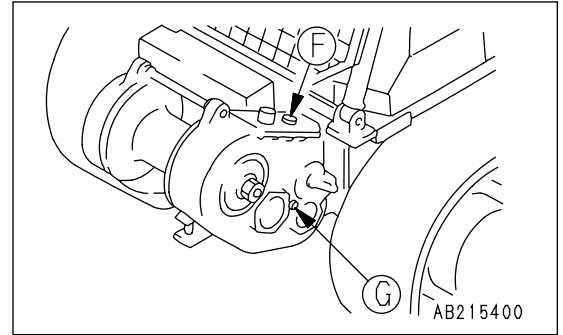
Use oil to match the ambient temperature.

More than 0°C(32°F): Engine oil CD Class SAE30W

Less than 0°C(32°F): Engine oil CD Class SAE10W



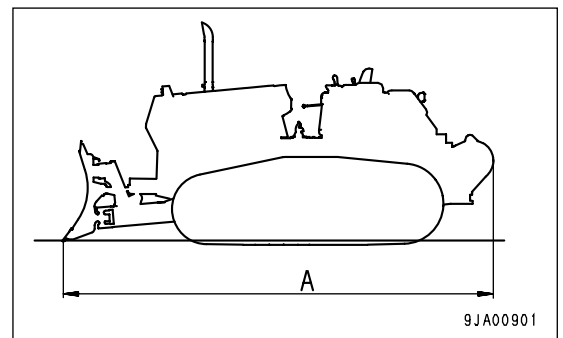
5. 5. After adding oil, remove oil level plug (G) and check that the oil level is close to the bottom of the plug hole. If the oil level is low, add oil through oil filler (F).



SPECIFICATIONS

- Power angle, power tilt dozer

Item		Unit	D61EX-12
Operating weight (not including operator)		kg (lb)	17,010 (37,507)
Weight of ripper (dry weight)		kg (lb)	1,290 (2,844)
(A)	Overall length	mm	
Tensile force of cable			
Bare drum		N {kgf}	255,580 {26,080}
Full drum		N {kgf}	147,490 {15,050}
Winding-in speed of cable			
Normal rotation	Bare drum	n/min	27
	Full drum	n/min	46
Reverse rotation	Bare drum	n/min	60
	Full drum	n/min	104
Installed cable (diameter x length)		mm (in)	26 X 65 (1 X 2.6)



SUSPENSION SEAT

(Deluxe seat)

⚠ WARNING

- Adjust the seat position at the beginning of each shift or when operators change.
- Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.

(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: 160mm (6.3in) (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 120kg (110 to 265lb)

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) Adjuster 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.

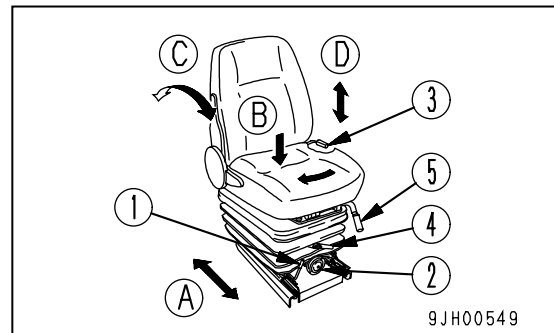
(D) Height adjustment of seat

- 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, 50mm (2.0in))

(E) Adjusting direction of seat

Pull up lever(6) 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.



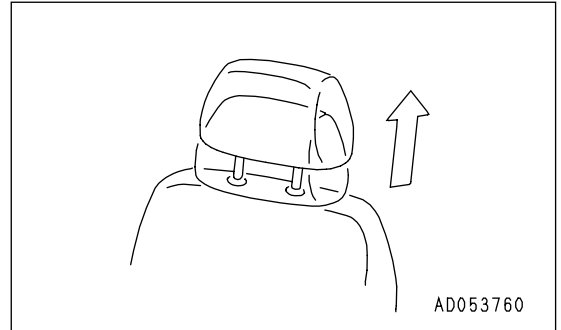
HEADREST

Removal of headrest

Pull up the headrest.

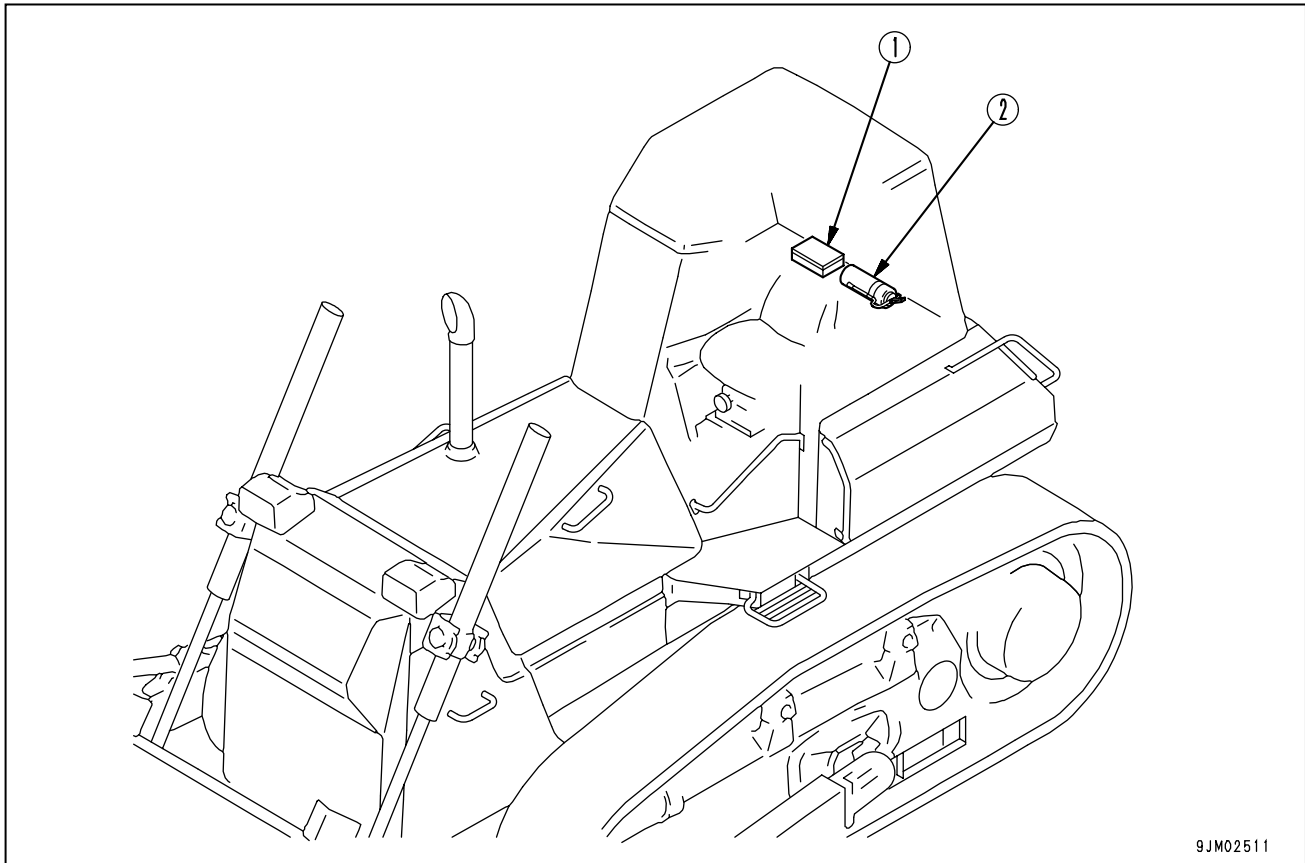
REMARK

The headrest cannot be fixed to halfway.



EQUIPPING THE FIRE EXTINGUISHER AND THE 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.



9JM02511

(1)First-aid kit

(2)Fire extinguisher

For brackets, please contact your Komatsu distributor.

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MEMO

D61EX-12, D61PX-12 BULLDOZER

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