

# **Operation & Maintenance Manual**

## **GALEO**

### **D65EX-15**

### **D65PX-15**

### **D65WX-15**

## **BULLDOZER**

<b>SERIAL NUMBERS</b>	<b>D65EX-15</b>	<b>67001 and up</b>
	<b>D65PX-15</b>	<b>67001 and up</b>
	<b>D65WX-15</b>	<b>67001 and up</b>

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# FOREWORD

## **CALIFORNIA**

### **Proposition 65 Warning**

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

## **CALIFORNIA**

### **Proposition 65 Warning**

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

**Wash hands after handling.**

## FOREWORD

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



### WARNING

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.

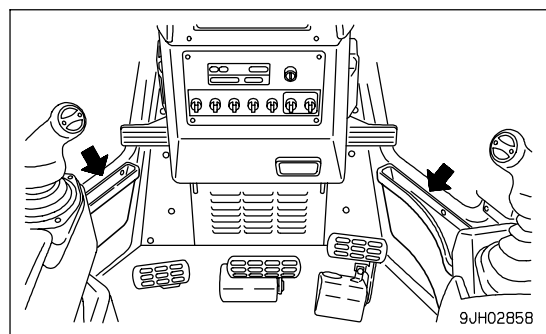
Keep this manual at the storage location for the operation and maintenance manual given below, and have all personnel read it periodically.

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.

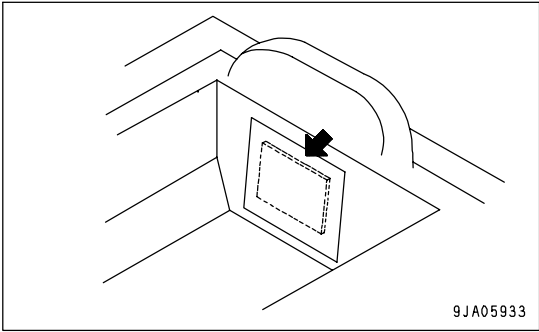
If you sell the machine, be sure to give this manual to the new owners together with the machine.

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:  
If machine is equipped with a cab.  
Inside of right and left doors



If machine is not equipped with cab.  
Rear face of floor



**EMISSION CONTROL WARRANTY****EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)****1. Products Warranted**

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

**2. Coverage**

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

**3. Limitations**

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

**KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

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

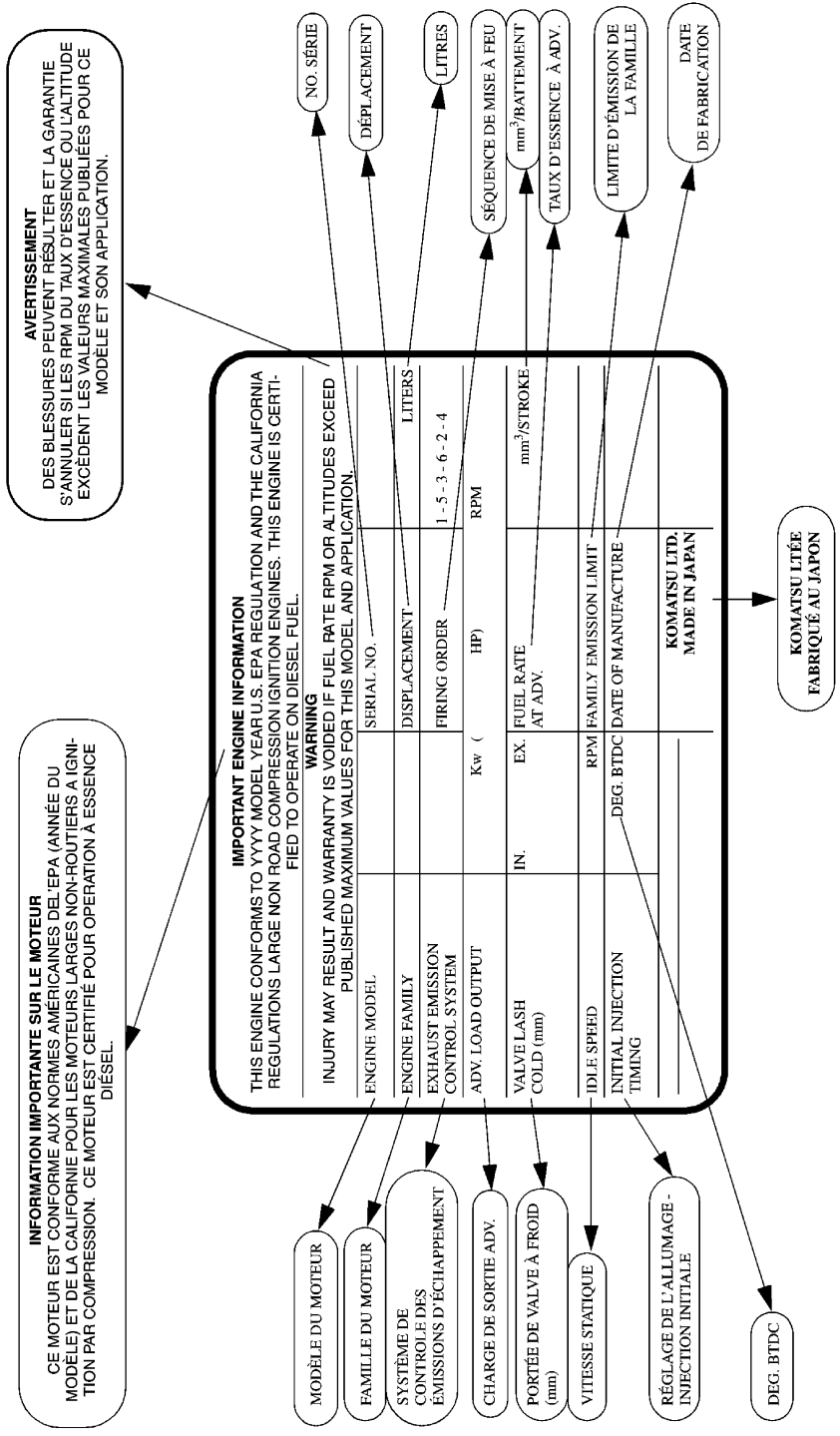
Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de 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.**



ENGINE DATA PLATE - ENGLISH / FRENCH


## SAFETY INFORMATION


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


### Signal words

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


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

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This word is used also to alert against unsafe practices that may cause property damage.

### Example of safety message using signal word

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

### Other signal words

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

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

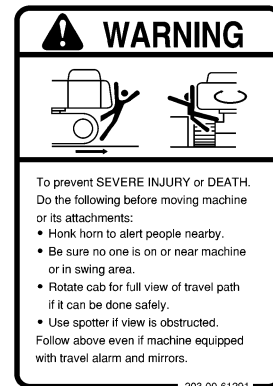
**REMARKS** This word is used for information that is useful to know.

• Safety labels

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

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

Example of safety label using words



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))



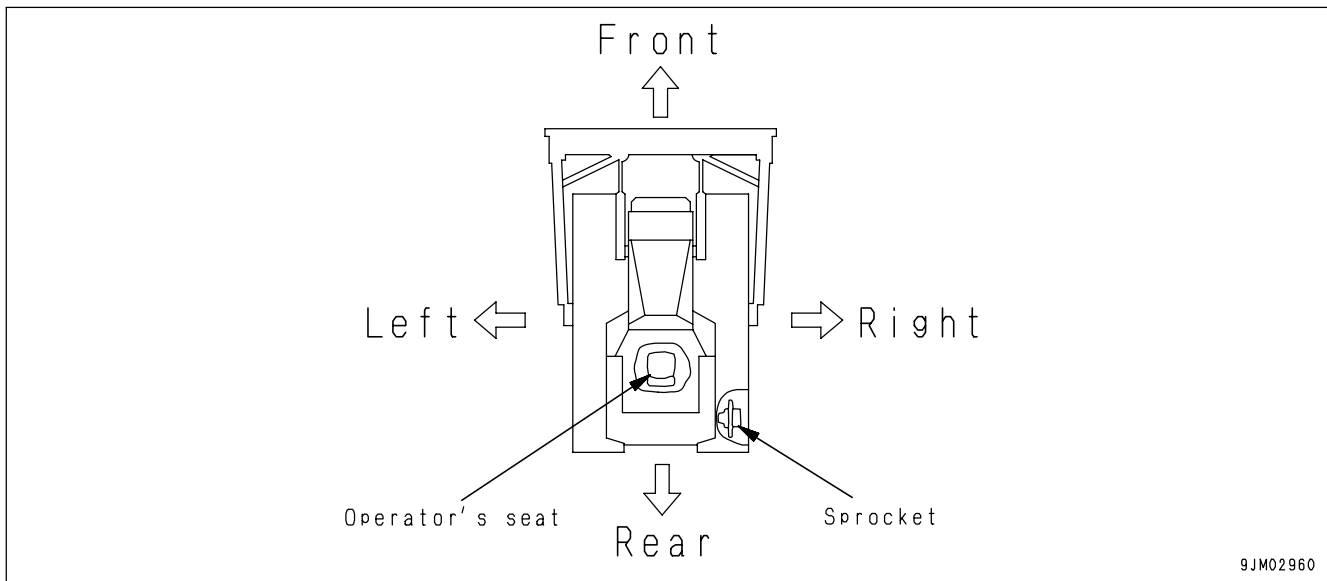
## INTRODUCTION

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

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

See the section "WORK POSSIBLE USING BULLDOZER (PAGE 3-103)" 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 seat when the operator's seat is facing the front and the sprocket is at the rear of the machine.

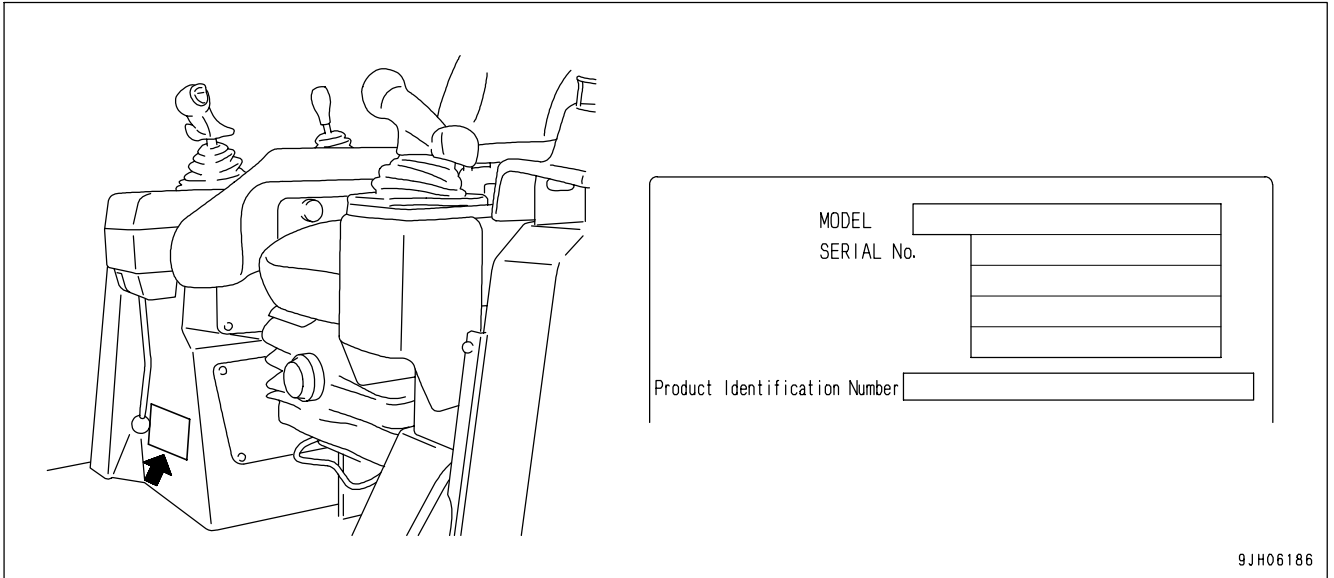
## NECESSARY INFORMATION

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

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

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

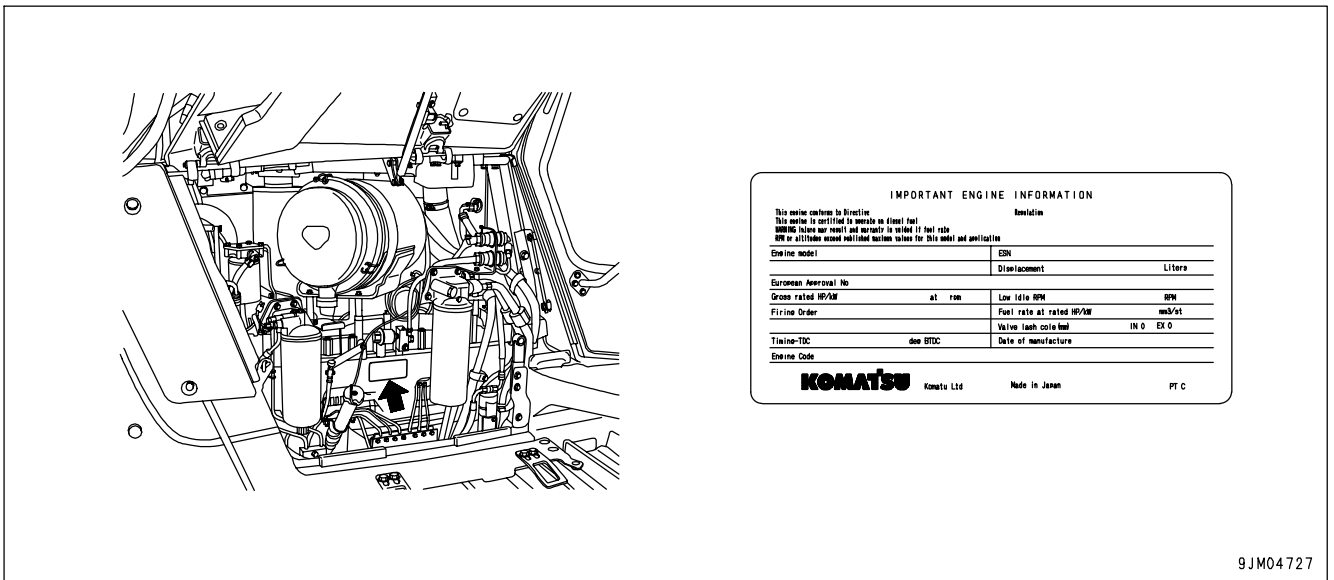
The design of the nameplate differs according to the territory.



9JH06186

### ENGINE SERIAL NO. PLATE

The nameplate for this machine is provided at the center of the left side of the engine cylinder block.

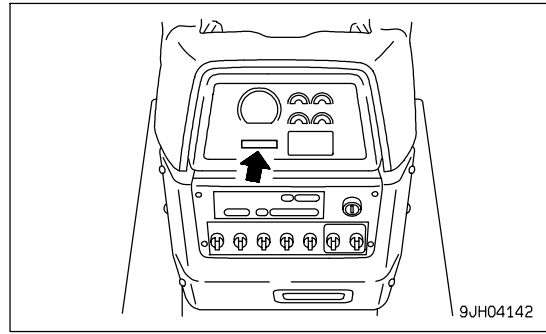


9JM04727

EPA: Environmental Protection Agency, U.S.A.

**POSITION OF SERVICE METER**

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



**TABLE OF ENTER SERIAL NO. AND DISTRIBUTOR**

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

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# SAFETY

## **WARNING**

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

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## SAFETY

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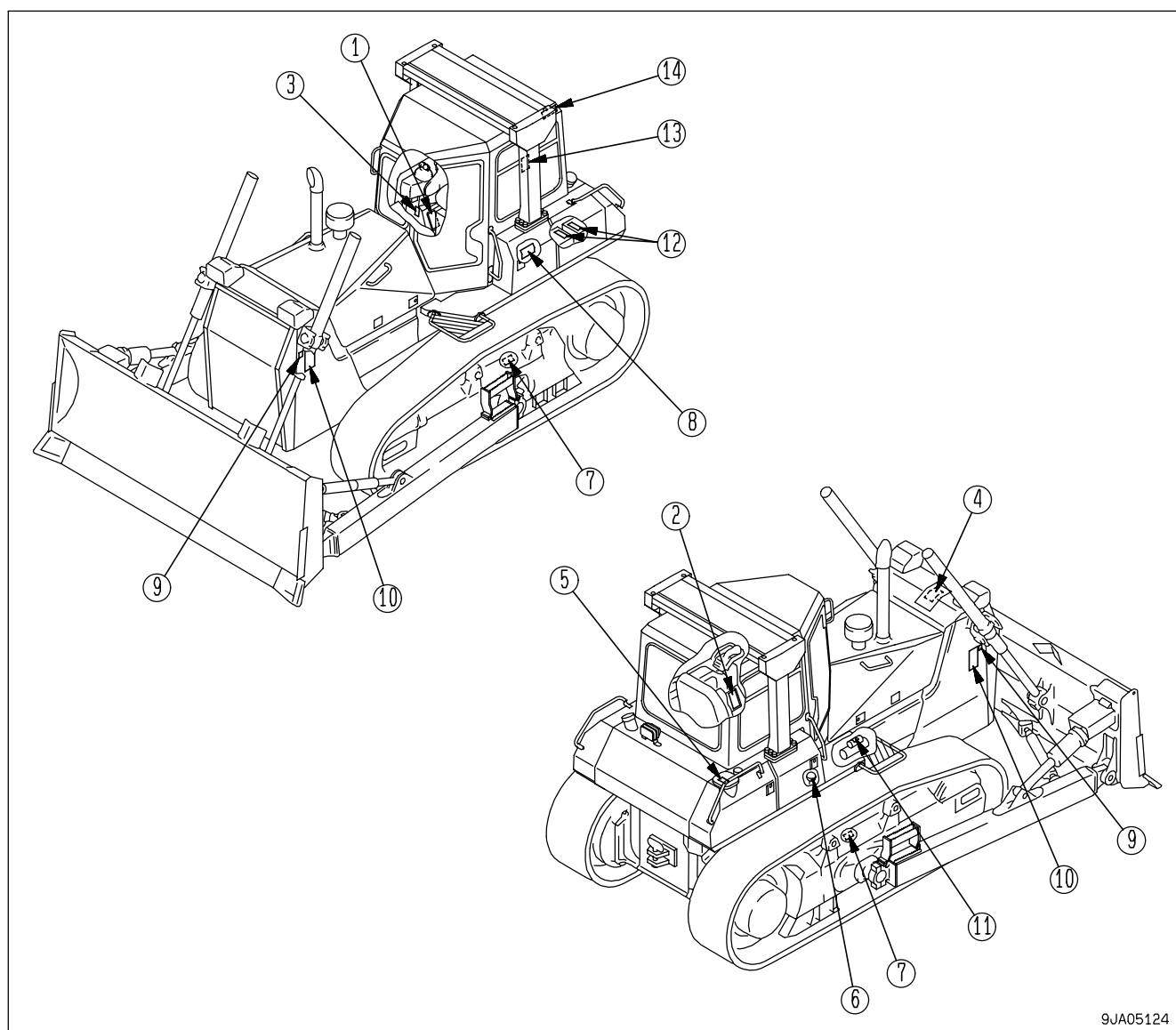
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## SAFETY LABELS

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. These may cause the labels to peel off.
- There are also other labels in addition to the warning signs and safety labels. Handle those labels in the same way.
- If the labels are damaged, lost, or cannot be read properly, replace them with new ones. For details of the part numbers for the labels, see this manual or the actual label, and place an order with Komatsu distributor.

## POSITIONS OF SAFETY PICTOGRAMS

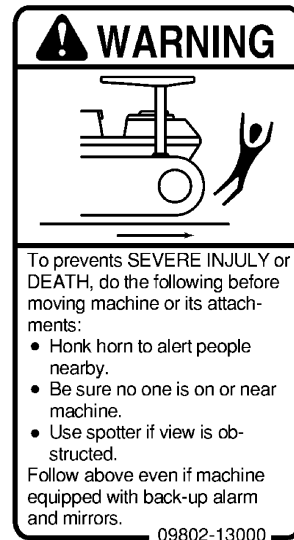


**SAFETY LABELS**

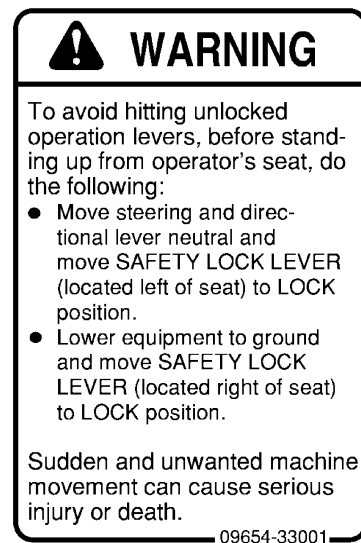
- (1) Caution before operating or maintaining machine  
(09651-03001)



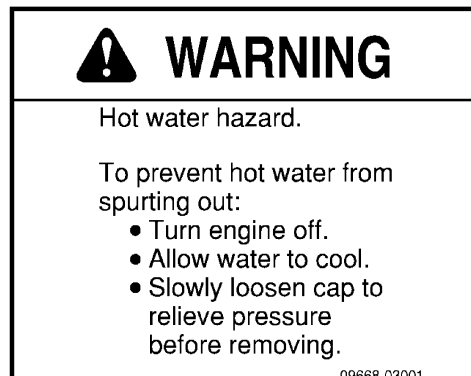
- (2) Caution before moving in reverse (09802-13000)



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



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



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

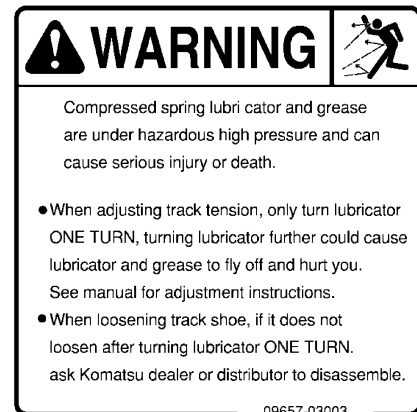


- (6) Caution for accumulator (09659-53000)

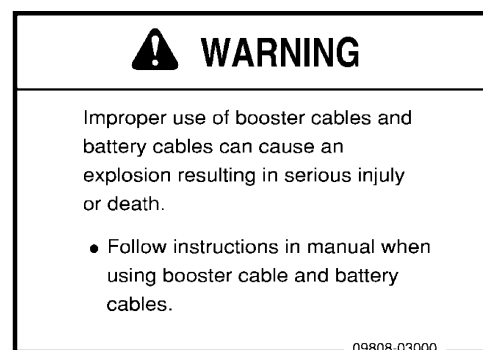


## (7) Caution for adjusting track tension (09657-03003)

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



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



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



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



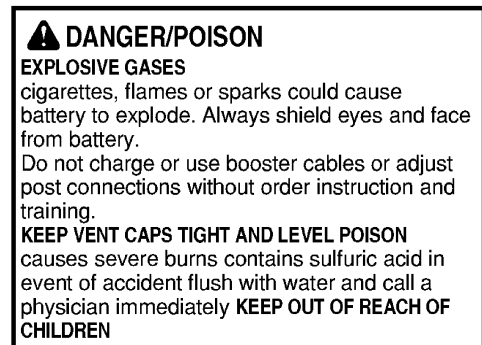
(11) Jump start prohibited (09842-A0481)



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

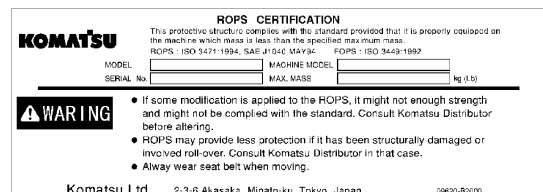
Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.

(12) Precautions when handling battery

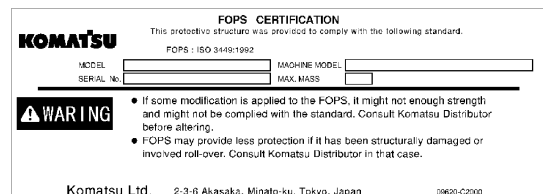


(This plate is stick on the machine by the battery maker.)

(13) Caution for ROPS (09620-B2000)



(14) Caution for FOPS (09620-C2000)



## GENERAL PRECAUTIONS

### SAFETY RULES

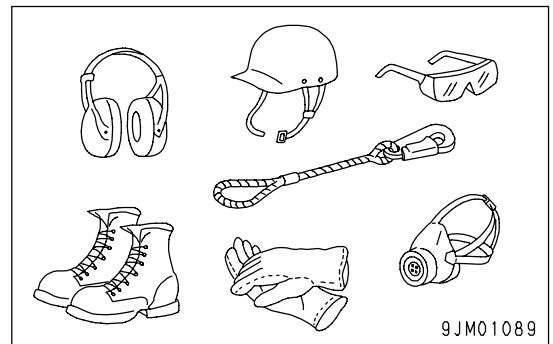
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine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

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

### CLOTHING AND PERSONAL PROTECTIVE ITEMS

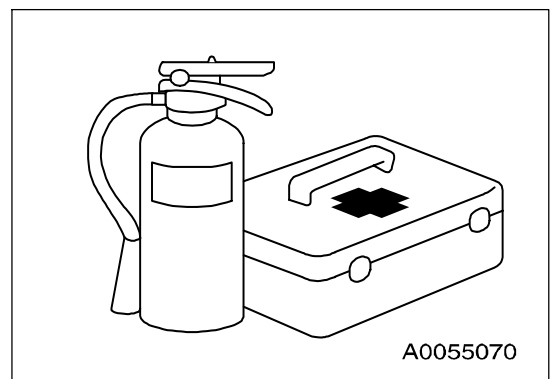
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get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



### FIRE EXTINGUISHER AND FIRST AID KIT

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

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



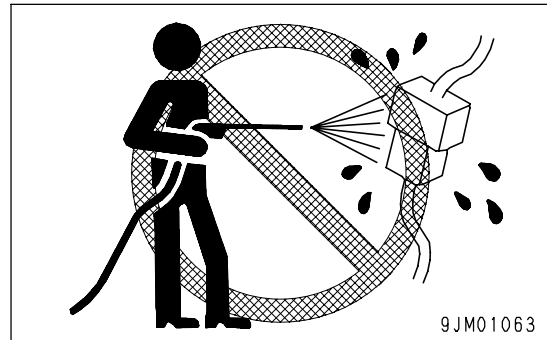
### SAFETY FEATURES

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



**KEEP MACHINE CLEAN**

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

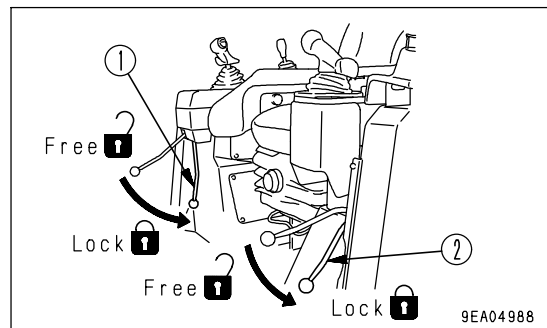
**INSIDE OPERATOR'S COMPARTMENT**

- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Do not use cellular telephones inside the operator's compartment when driving or operating the machine.
- Never bring any dangerous objects such as flammable or explosive items into the operator's compartment.

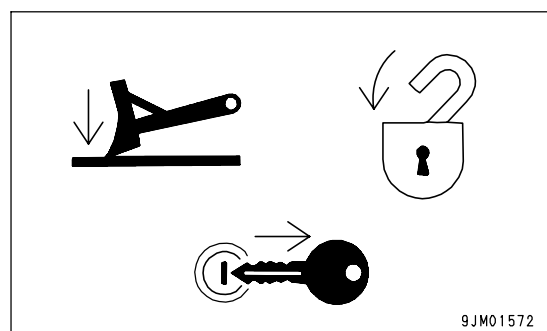
**ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT**

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

If you accidentally touch the levers when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.



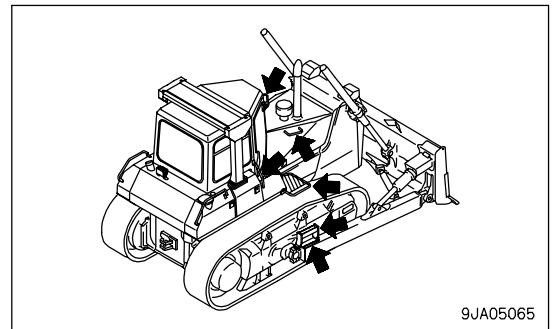
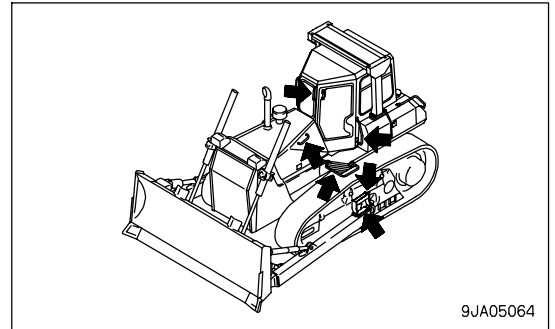
- When leaving the machine, always lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) securely to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.



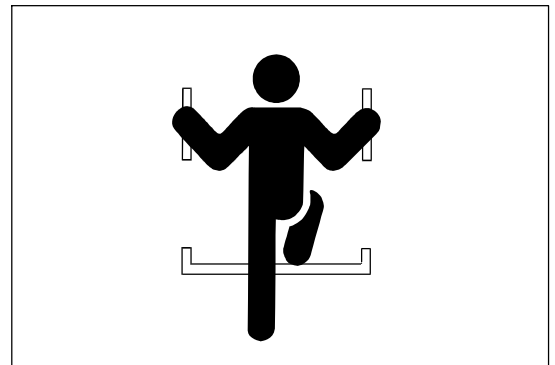
### HANDRAILS AND STEPS

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.



- 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, or work equipment lock lever when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Do not get on or off the machine while holding tools in your hand.



### MOUNTING AND DISMOUNTING

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

### NO PEOPLE ON ATTACHMENTS

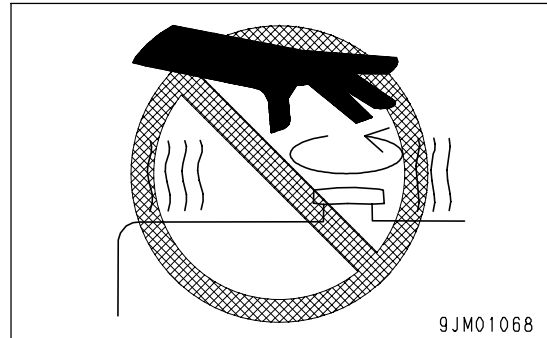
Never let anyone ride on the work equipment, or other attachments. There is a hazard of falling and suffering serious injury.

### CRUSHING OR CUTTING PREVENTION

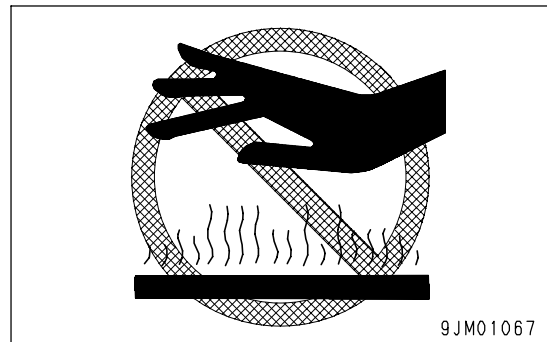
The clearance around the work equipment will change according to the movement of the link. If you get caught, this may lead to serious personal injury. Do not allow anyone to approach any rotating or telescoping part.

**PREVENTION OF BURNS****Hot coolant**

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

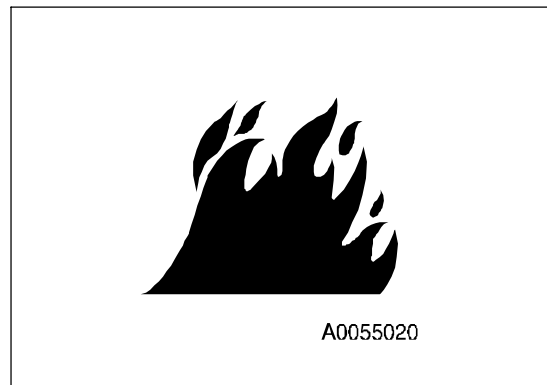
**Hot oil**

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

**FIRE PREVENTION****• Fire caused by fuel or oil**

Fuel, oil, antifreeze, and window washer liquid are particularly flammable and can be hazardous. To prevent fire, always observe the following:

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

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

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

- **Fire coming from electric wiring**

Short circuits in the electrical system can cause fire.

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

- **Fire coming from hydraulic line**

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

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

- **Explosion caused by lighting equipment**

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

### **ACTION IF FIRE OCCURS**

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

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

### **WINDOW WASHER LIQUID**

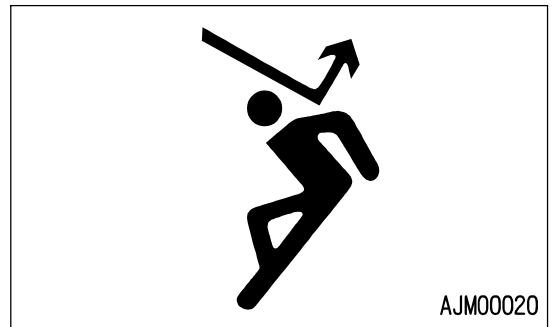
Use an ethyl alcohol base washer liquid.

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

### **PRECAUTIONS WHEN USING ROPS**

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

- If ROPS is installed, do not remove it when operating the machine.
- ROPS is installed to protect the operator when machine rolls over. When machine rolls over, ROPS supports its weight and absorbs its impact energy.
- If ROPS is modified, its strength may be reduced. When modifying, consult your Komatsu distributor.
- If ROPS is 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.
- 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. Therefore contact your Komatsu distributor for advice.
- Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.

**UNAUTHORIZED MODIFICATION**

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

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

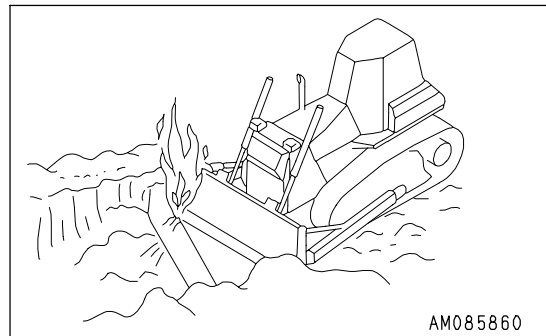
**SAFETY AT WORKSITE**

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

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

When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.

- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.

**WORKING ON LOOSE GROUND**

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

**DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES**

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

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.

- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.
- 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 of Cables	Safety Distance
100 V - 200 V	Over 2 m (7 ft)
6,600 V	Over 2 m (7 ft)
22,000 V	Over 3 m (10 ft)
66,000 V	Over 4 m (14 ft)
154,000 V	Over 5 m (17 ft)
187,000 V	Over 6 m (20 ft)
275,000 V	Over 7 m (23 ft)
500,000 V	Over 11 m (36 ft)

**ENSURE GOOD VISIBILITY**

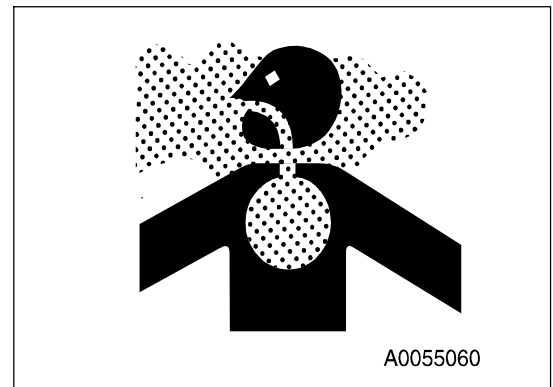
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

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

**VENTILATION FOR ENCLOSED AREAS**

Exhaust fumes from the engine can kill.

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



**CHECKING SIGNALMAN'S SIGNALS AND SIGNS**

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

**EMERGENCY EXIT FROM OPERATOR'S CAB**

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

**BE CAREFUL ABOUT ASBESTOS DUST**

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

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

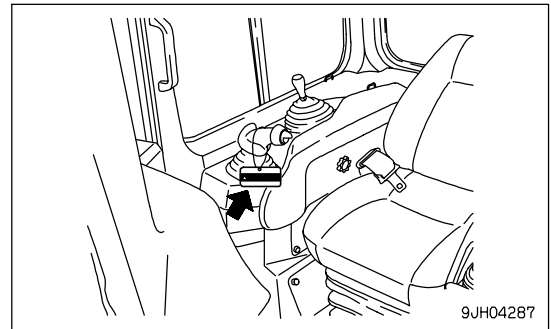
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.



## PRECAUTIONS FOR OPERATION

### STARTING ENGINE

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



### CHECKS BEFORE STARTING ENGINE

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

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

### PRECAUTIONS WHEN STARTING

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

### PRECAUTIONS IN COLD AREAS

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



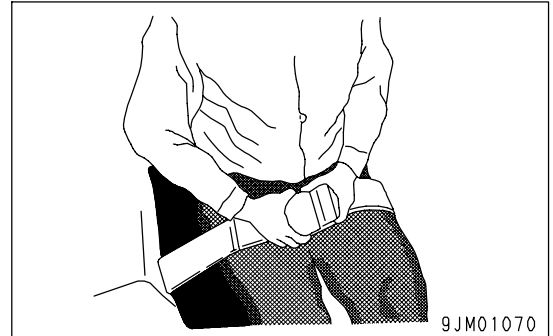
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery and cause the battery to explode. Before charging or starting the engine with a different power source, melt the battery electrolyte and check that there is no leakage of electrolyte before starting.

## OPERATION

### CHECKS BEFORE OPERATION

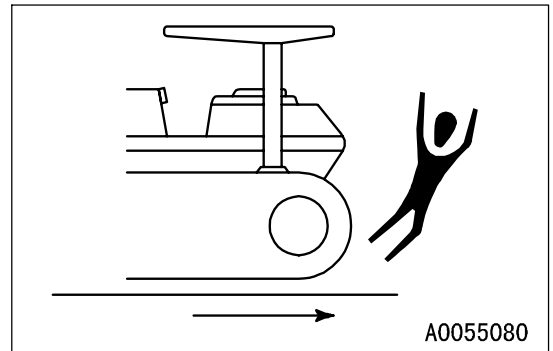
When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

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



### PRECAUTIONS FOR MOVING MACHINE FORWARD OR IN REVERSE

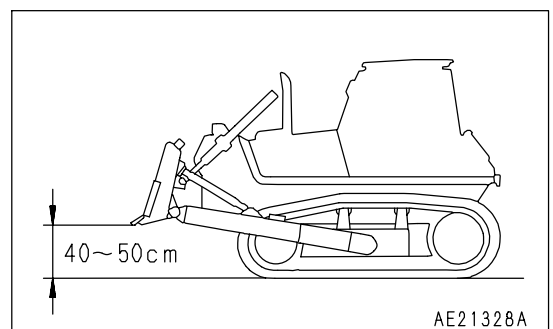
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check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



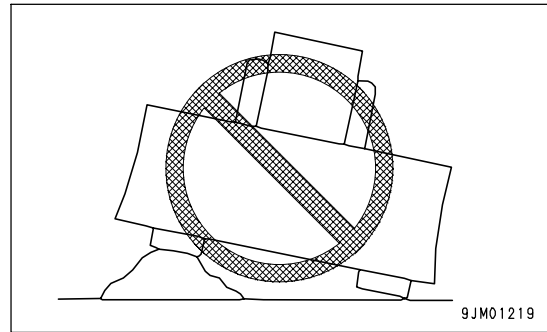
Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

### PRECAUTIONS WHEN TRAVELING

- When traveling on level ground, keep the work equipment at a height of 40 to 50 cm (16 to 20 in) from the ground.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.



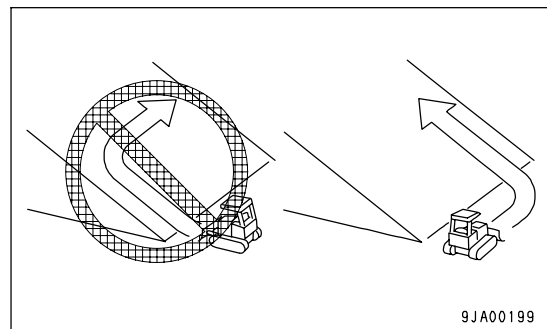
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.
- Do not approach the edge of a cliff carelessly. When dropping soil over a cliff for banking or reclamation, leave soil of one scoop at the edge of the cliff and push it with the next scoop.
- When the machine passes over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, and there is danger that the travel speed rises suddenly. To prevent this, lower the travel speed.
- If the machine moves with only either side of the blade loaded, its tail may swing. Take care.



**TRAVELING ON SLOPES**

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

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



**USING BRAKES**

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

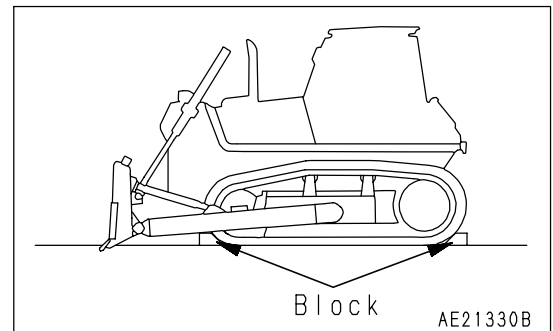
**OPERATE CAREFULLY ON SNOW**

- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.

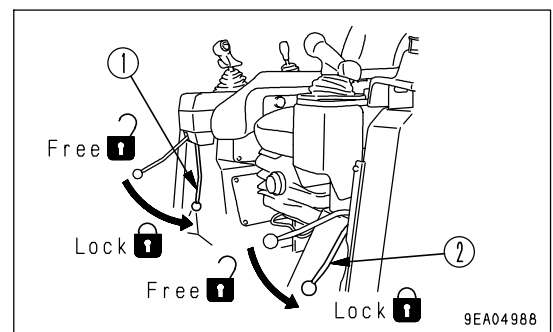
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.
- When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while 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

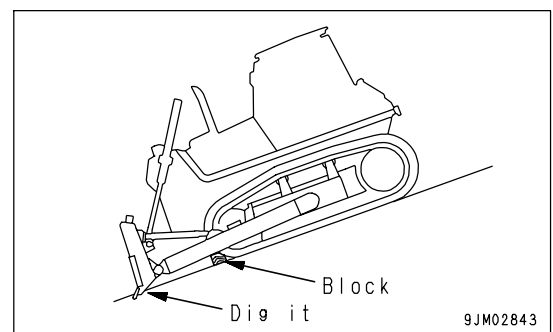
- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



- When leaving the machine, set the steering, forward-reverse, gear shift lever in the N (Neutral) position and set the blade lever in the HOLD position, then apply work equipment lock lever (1) and parking brake 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.



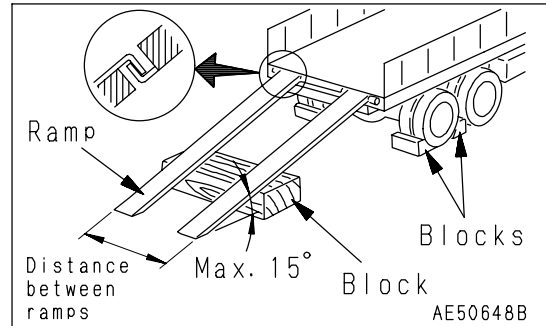
## TRANSPORTATION

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

### LOADING AND UNLOADING

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

- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of the road or cliff.
- Always use ramps of adequate strength. Be sure that the ramps are wide, long, and thick enough to provide a safe loading slope. Take suitable steps to prevent the ramps from moving out of position or coming off.
- Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from machine-tracks. On a rainy day, in particular, be extremely careful since the ramp surface is slippery.
- Run the engine at low speed and travel slowly.
- When on the ramps, do not touch any other parts.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- For machines equipped with a cab, always lock the door after boarding the machine. If this is not done, the door may suddenly open during transportation. Refer to "TRANSPORTATION (PAGE 3-115)".



### SHIPPING

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

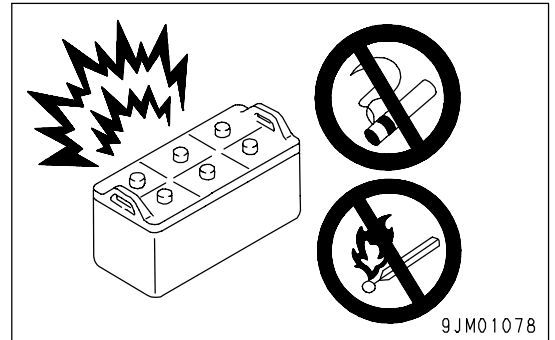
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see "TRANSPORTATION (PAGE 3-115)" in the OPERATION section.

## BATTERY

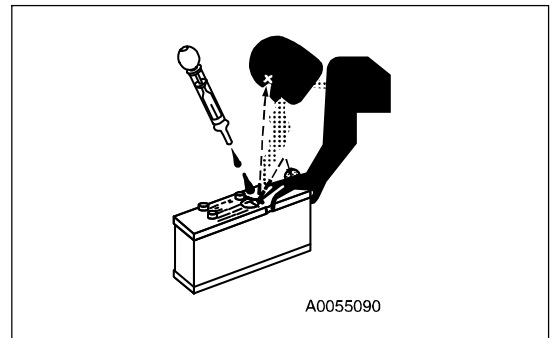
### BATTERY HAZARD PREVENTION

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

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



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



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

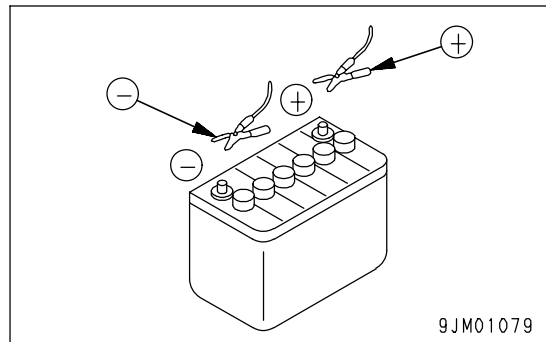
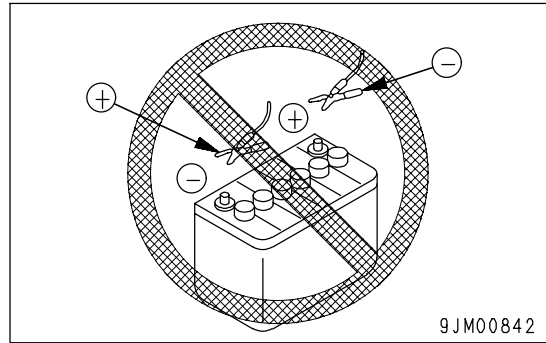
As there is a hazard that sparks will be generated, always do as follows.

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

**STARTING WITH BOOSTER CABLE**

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

- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator's seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety goggles and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see "STARTING ENGINE WITH BOOSTER CABLE (PAGE 3-130)" in the OPERATION section.



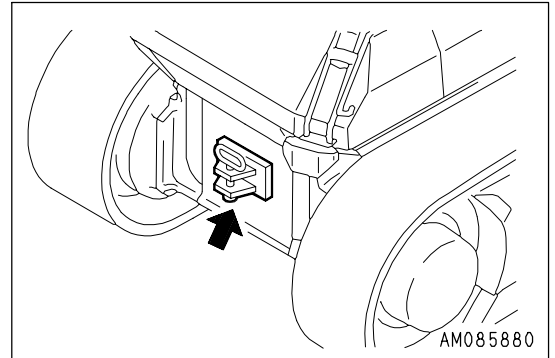
## TOWING

### WHEN TOWING

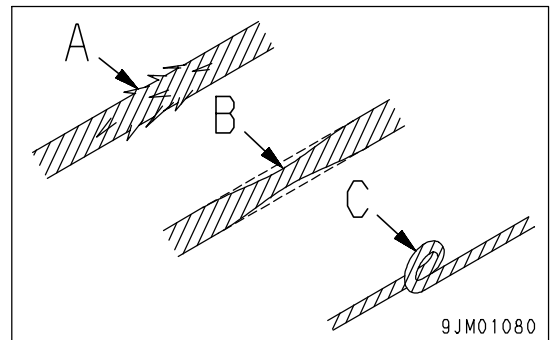
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing method, see section "MACHINE TOWING METHOD (PAGE 3-127)".

- 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.

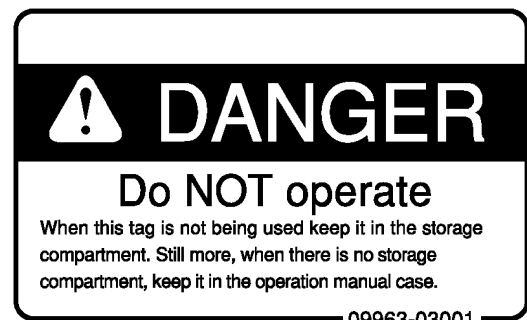
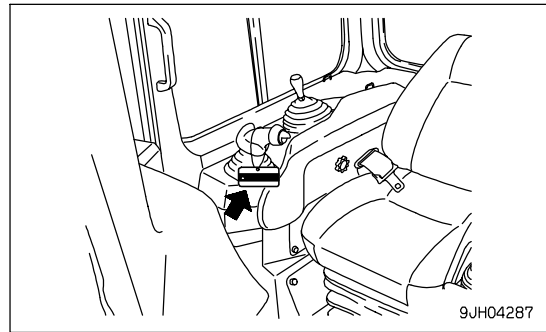




# PRECAUTIONS FOR MAINTENANCE

## WARNING TAG

- Always attach the "DO NOT OPERATE" warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine. Attach additional warning tags around the machine if necessary. Warning tag Part No. 09963-03001  
Keep this warning tag in the tool box while it is not used. If there is no toolbox, keep the tag in the operation manual pocket.
- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.



## KEEP WORK PLACE CLEAN AND TIDY

Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean 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.

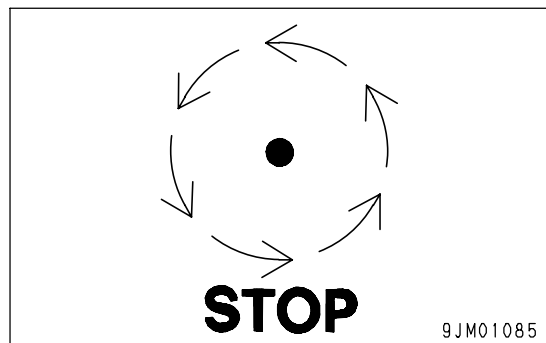
## APPOINT LEADER WHEN WORKING WITH OTHERS

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

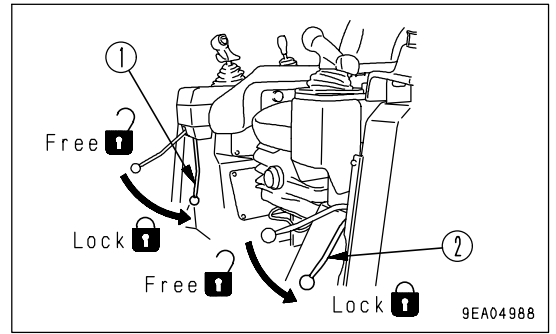
When working with others, misunderstandings between workers can lead to serious accidents.

## STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

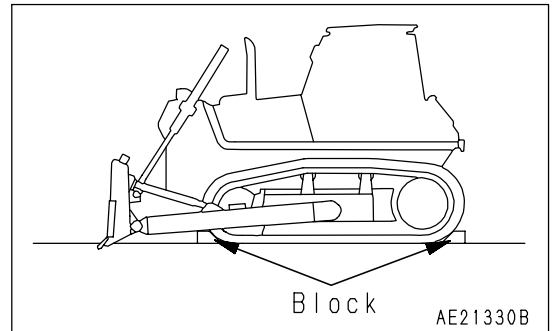
- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.



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



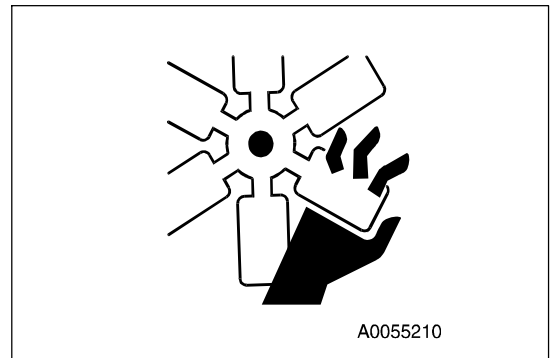
- Put blocks under the track to prevent the machine from moving.



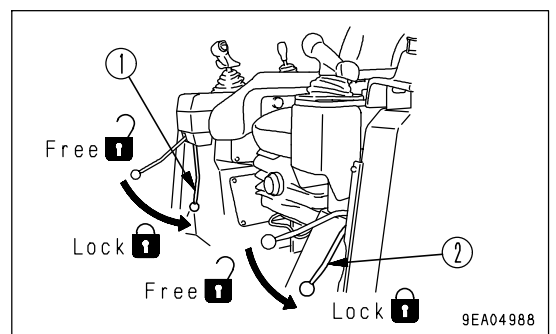
**TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING**

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.

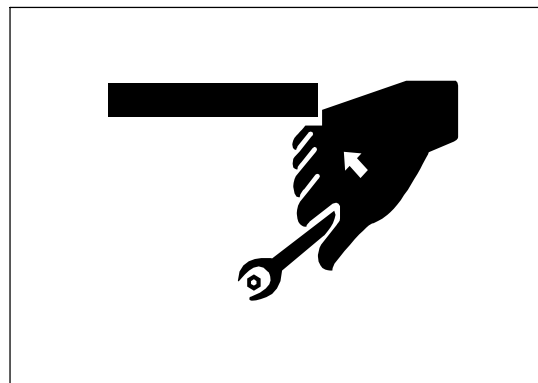


- Set work equipment lock lever (1) and parking brake lever (2) to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Do not touch any control levers. If any control lever must be operated, give a signal to the other workers to warn them to move to a safe place.
- 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.



**ACCUMULATOR**

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

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

Please contact your Komatsu distributor to have this work performed.



**NO UNAUTHORIZED PERSONNEL INTO AREA**

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

**ATTACHMENTS**

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



**WORK UNDER THE MACHINE**

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

**NOISE**

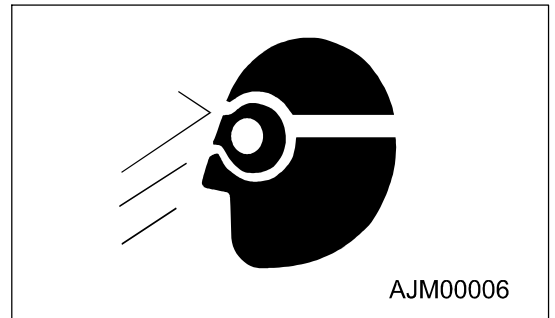
When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

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

**PRECAUTIONS WHEN USING HAMMER**

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

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

**REPAIR WELDING**

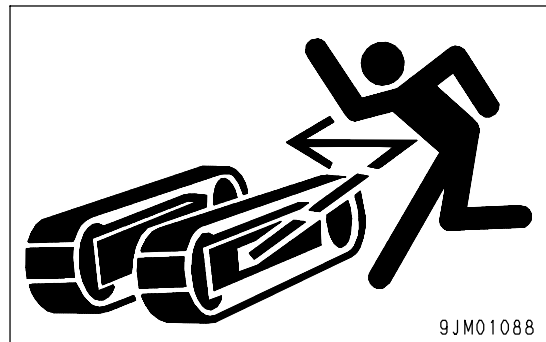
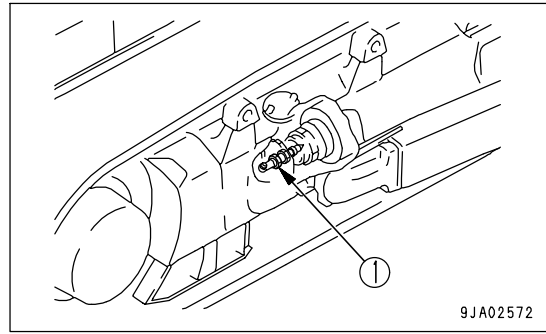
Welding operations must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

**REMOVING BATTERY TERMINAL**

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

**PRECAUTIONS WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION**

- Grease is pumped into the track tension adjustment system under high pressure.  
If the specified procedure for maintenance is not followed when making adjustment, grease drain plug (1) may fly out and cause serious injury or property damage.
- When loosening grease drain plug (1) to loosen the track tension, never loosen it more than one turn. Loosen the grease drain plug slowly.
- Never put your face, hands, feet, or any other part of your body close to grease drain plug (1).



**DO NOT DISASSEMBLE RECOIL SPRING**

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

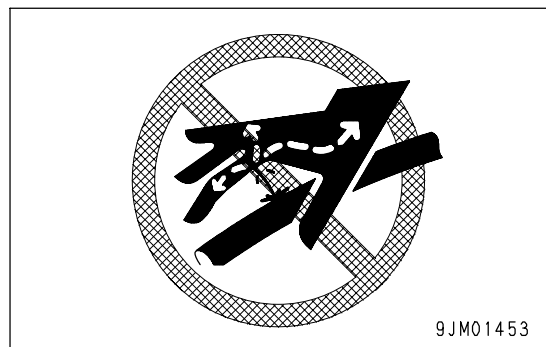
**PRECAUTION WITH HIGH-PRESSURE OIL**

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

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

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

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



**PRECAUTION FOR HIGH FUEL PRESSURE**

High pressure is generated inside the engine fuel piping when the engine is running. When carrying out inspection or maintenance of the fuel piping system, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before starting inspection or maintenance.

### HANDLING HIGH-PRESSURE HOSES

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

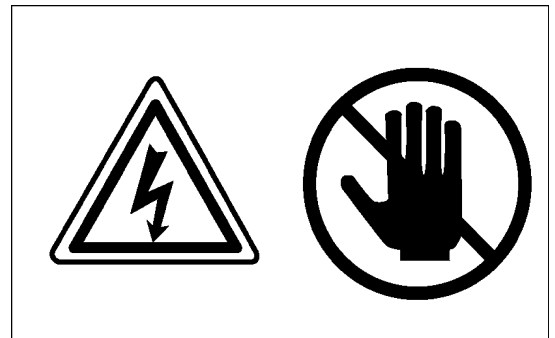
Replace the hose if any of the following problems are found.

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

### PRECAUTION FOR HIGH VOLTAGE

When the engine is running or immediately after it has stopped, high voltage is generated at the injector terminal and inside the engine controller, so there is danger of electrocution. Never touch the injector terminal or the inside of the engine controller.

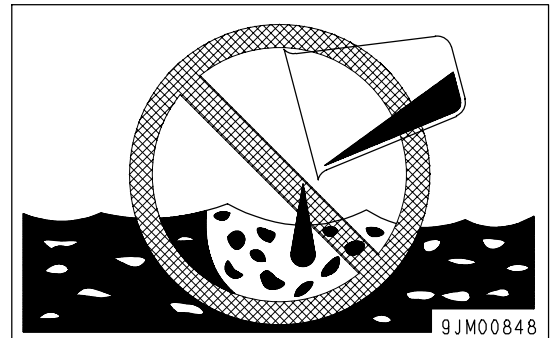
If it is necessary to touch the injector terminal or the inside of the engine controller, please contact your Komatsu distributor.



### WASTE MATERIAL

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

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



### MAINTENANCE FOR AIR CONDITIONER

If air conditioner refrigerant gets into your eyes, it may cause blindness; if it touches your skin, it may cause frostbite. Never touch refrigerant.

### COMPRESSED AIR

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

**PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS**

- In order for the machine to be operated 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 death. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety-critical parts if any defect is found, even when they have not reached the time specified interval.

# OPERATION

## **WARNING**

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

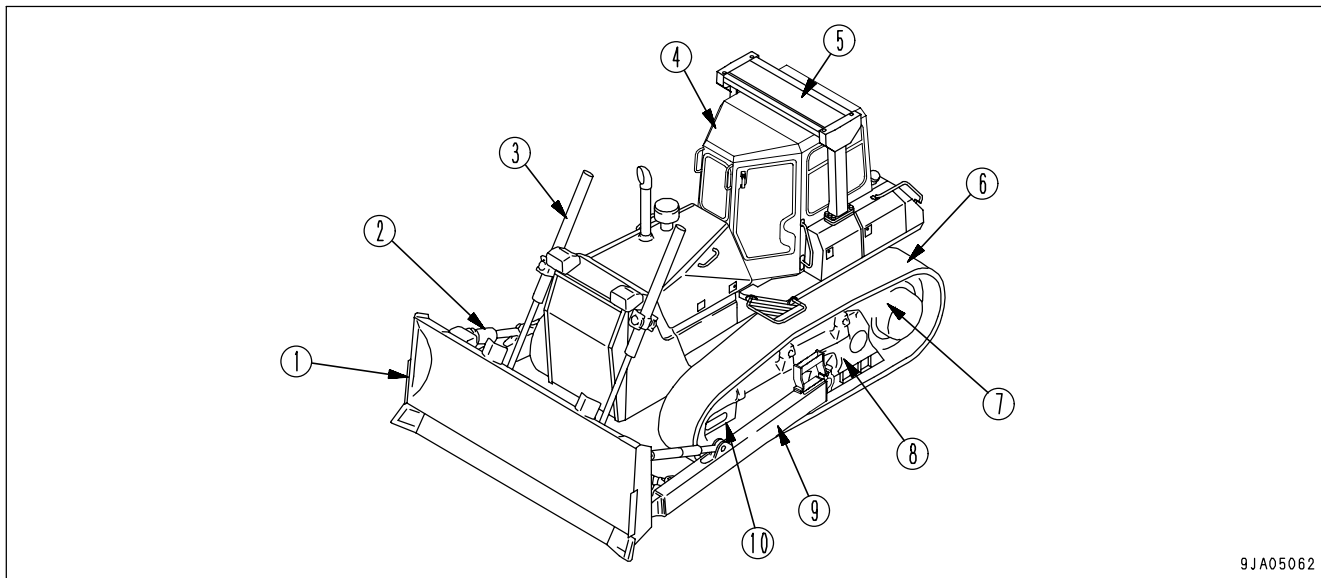
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# GENERAL VIEW

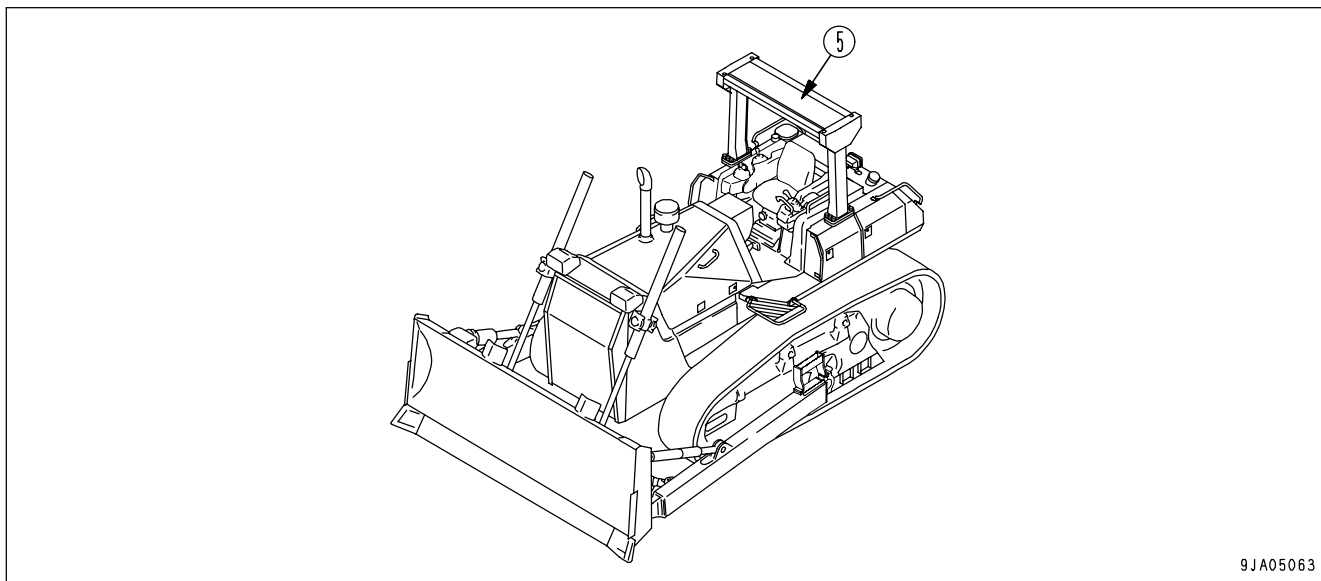
## GENERAL VIEW OF MACHINE

Machine equipped with cab



9JA05062

Machine equipped with canopy

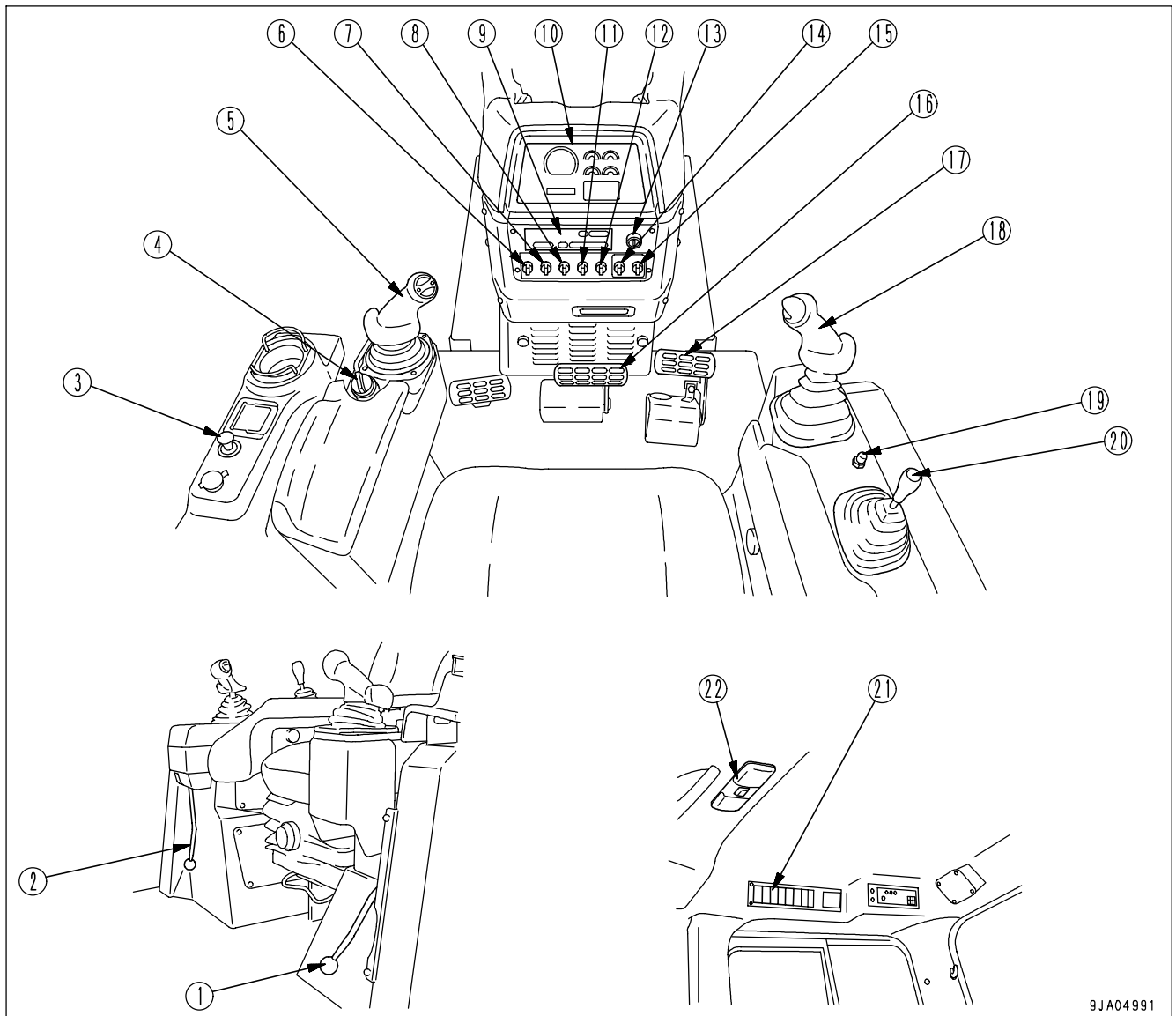


9JA05063

- |                   |                 |
|-------------------|-----------------|
| (1) Blade         | (6) Track shoe  |
| (2) Tilt cylinder | (7) Sprocket    |
| (3) Lift cylinder | (8) Track frame |
| (4) Cab           | (9) Push arm    |
| (5) ROPS canopy   | (10) Idler      |

## GENERAL VIEW OF CONTROLS AND GAUGES

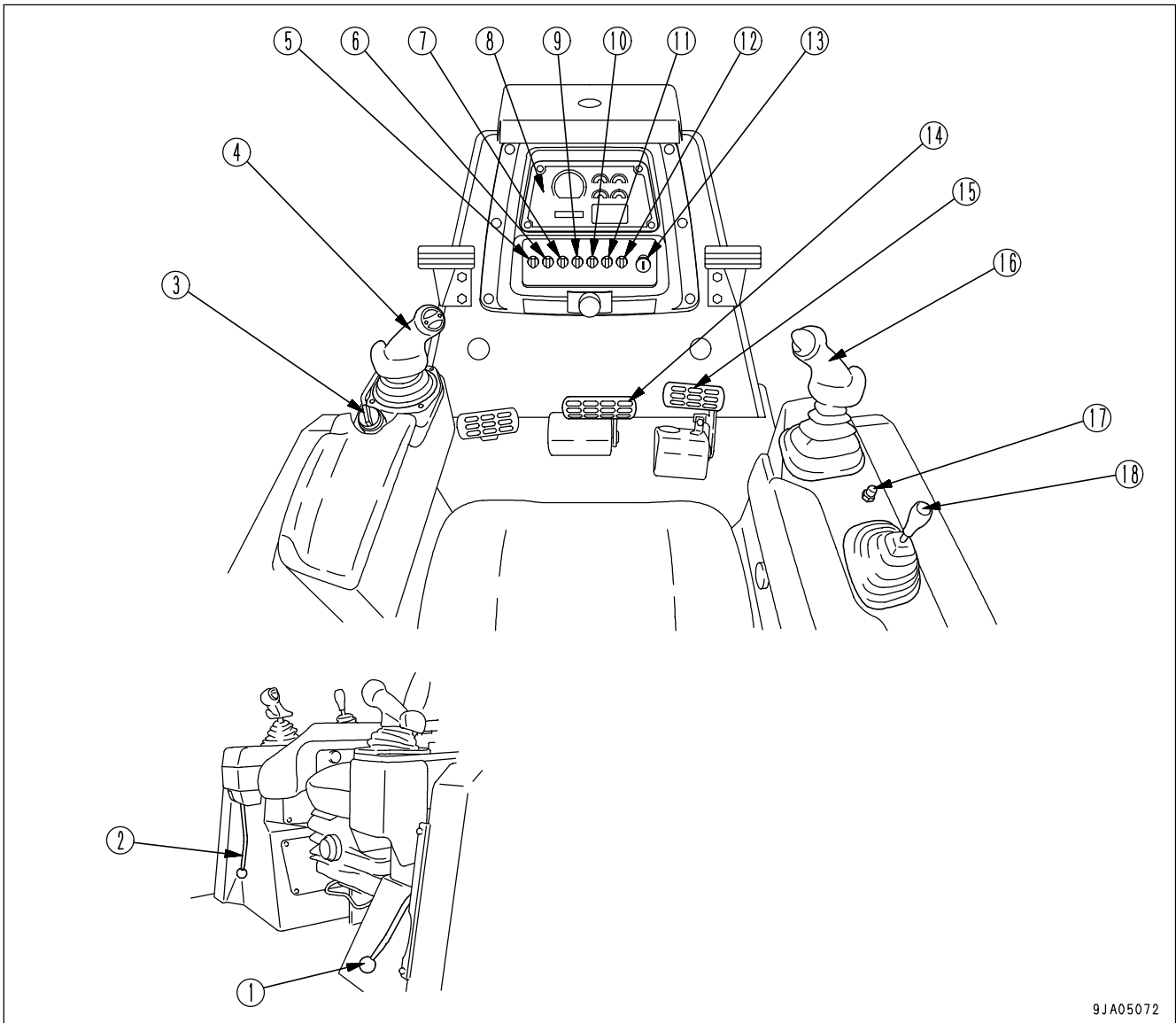
Machine equipped with cab



9JA04991

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

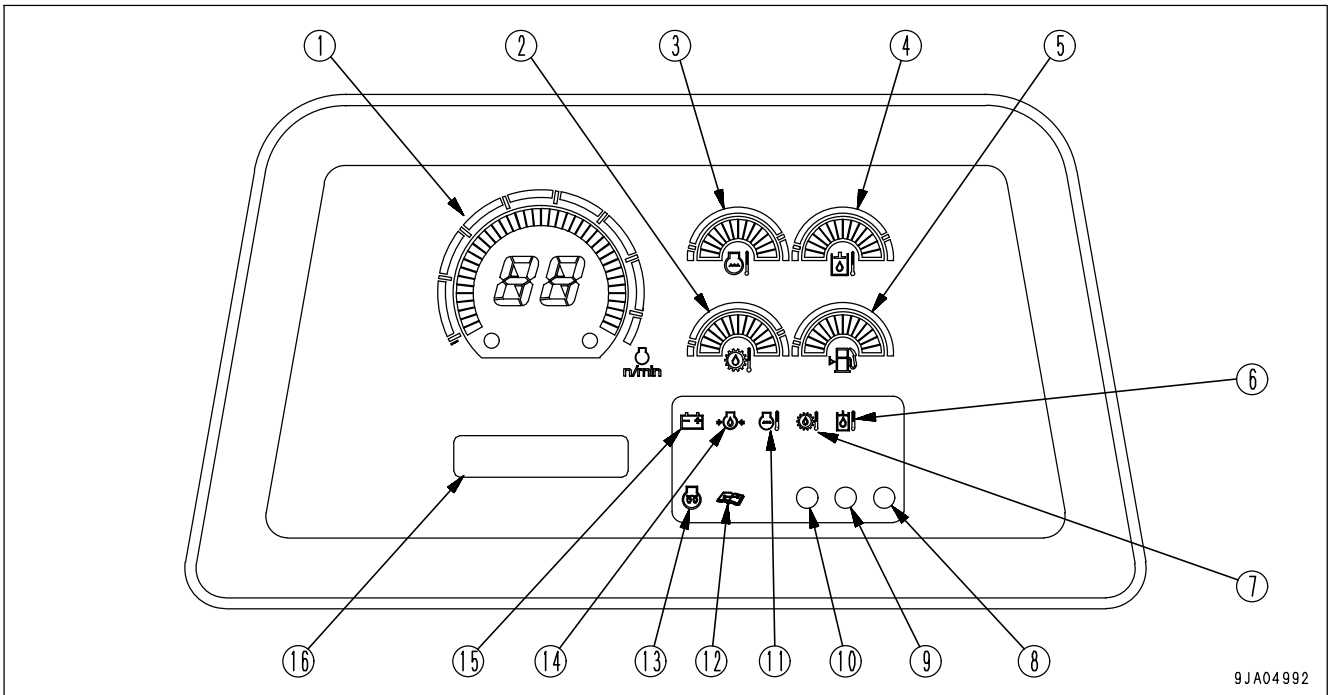
Machine equipped with canopy



9JA05072

- |   |   |
|---|---|
| (1) Parking brake lever                                   | (10) Fan rotation selector switch       |
| (2) Work equipment lock lever                             | (11) Information switch                 |
| (3) Fuel control dial                                     | (12) Buzzer cancel switch               |
| (4) Joystick (Steering, directional and gear shift lever) | (13) Starting switch                    |
| (5) Auto shift down switch                                | (14) Brake pedal                        |
| (6) Preset mode switch                                    | (15) Deceleration pedal                 |
| (7) Head lamp switch                                      | (16) Blade control lever                |
| (8) Monitor panel   | (17) Horn switch                        |
| (9) Rear lamp switch                                      | (18) Ripper control lever (if equipped) |

MONITOR PANEL



9JA04992

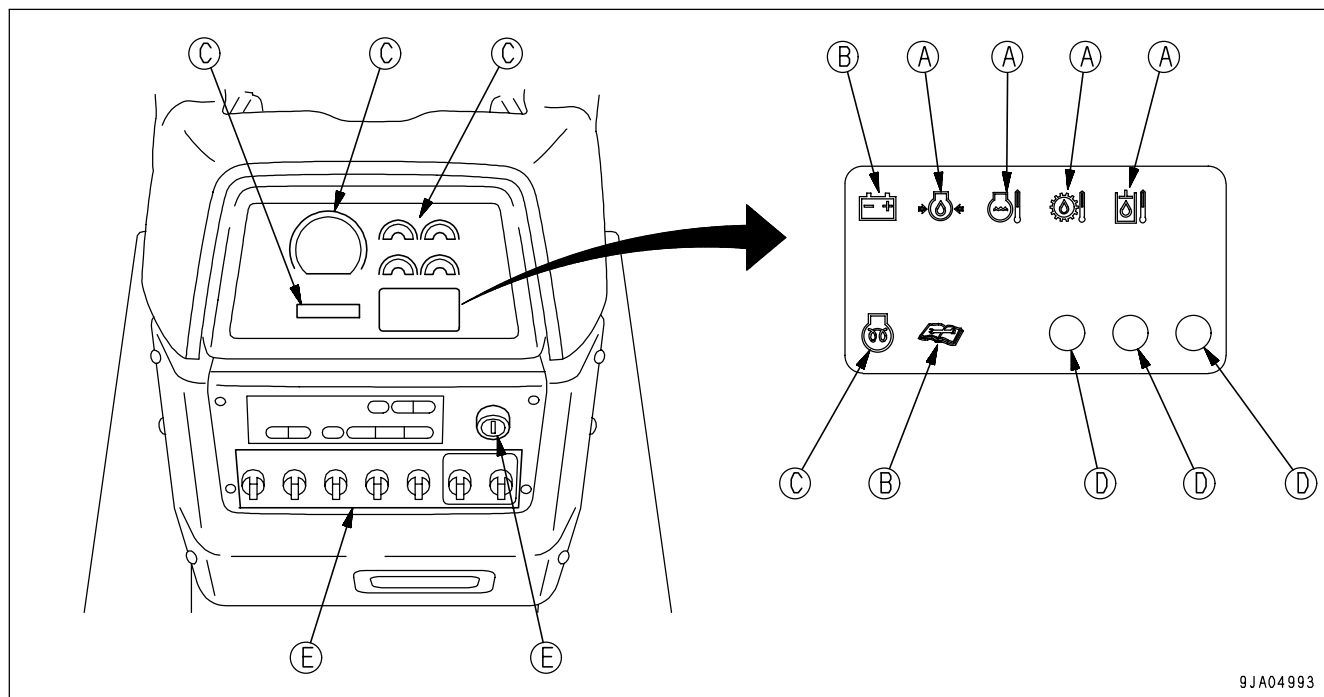
- |   |  |
|---|--|
| (1) Display panel A (Speed range, Engine speed) | (9) Filter, oil change interval lamp         |
| (2) Power train oil temperature gauge           | (10) Warning lamp                            |
| (3) Engine coolant temperature gauge            | (11) Engine coolant temperature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

# EXPLANATION OF COMPONENTS

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

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

## FRONT PANEL



9JA04993

- A: Emergency caution group
- B: Caution group
- C: Meter group

- D: Lamp
- E: Switch

## CHECK MONITOR SYSTEM

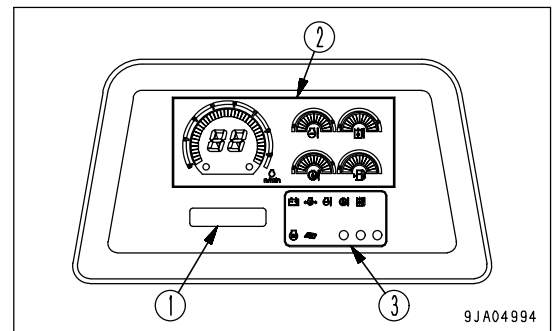
### MONITOR SYSTEM

#### NOTICE

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

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

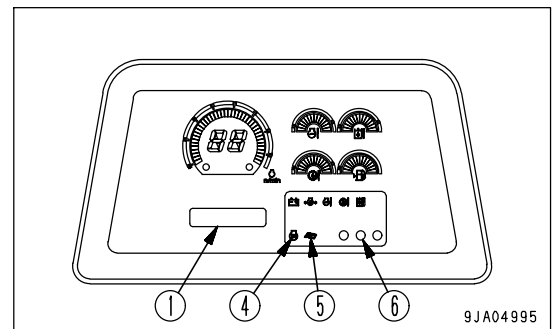
1. Turn the starting switch to the ON position.
2. Check that the monitor liquid-crystal display and the lamps all light up for 2 seconds, that the alarm buzzer sounds for 2 seconds, and that "KOMATSU SYSTEM CHECK" is displayed for 3 seconds on display panel B (multi-information) (1).
3.
  - After 2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



#### REMARK

The following cases do not indicate any problem.

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

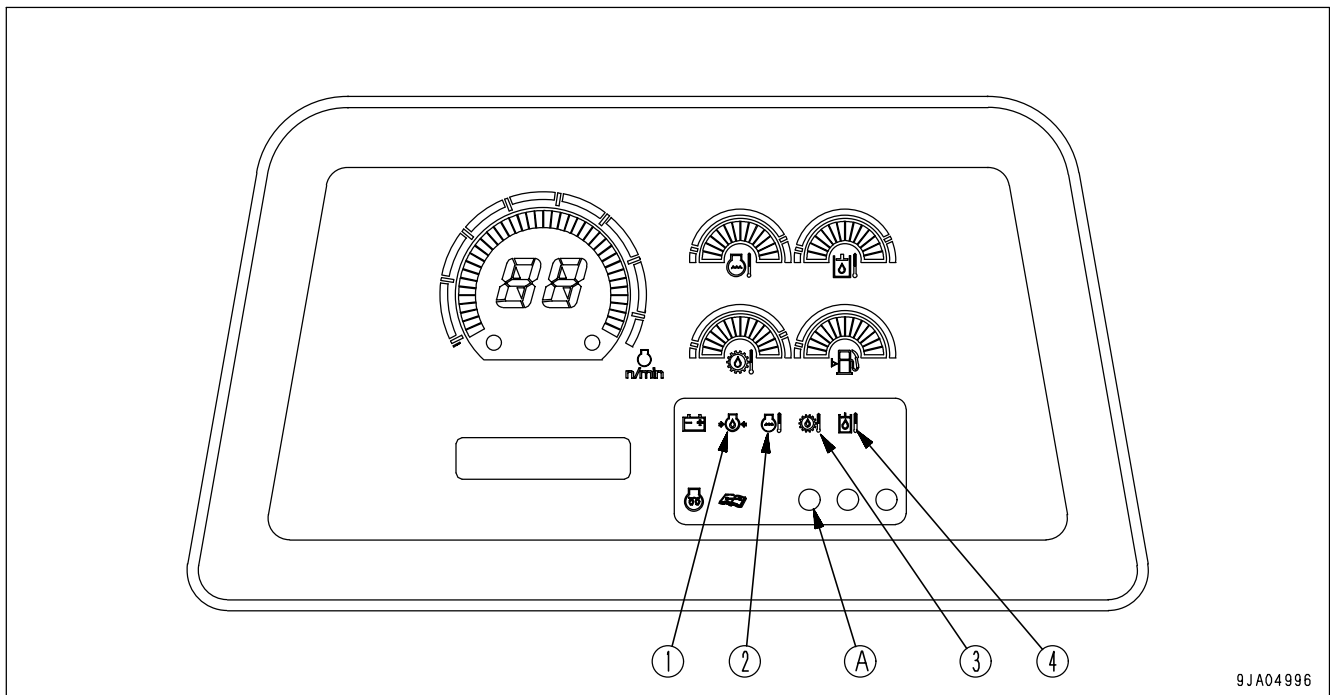


## EMERGENCY CAUTION ITEMS


**CAUTION**

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

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



9JA04996

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

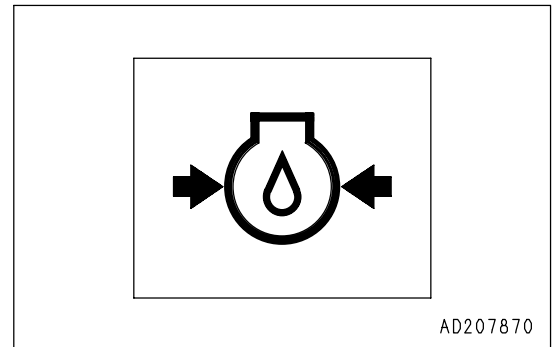
**ENGINE OIL PRESSURE CAUTION LAMP**

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

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

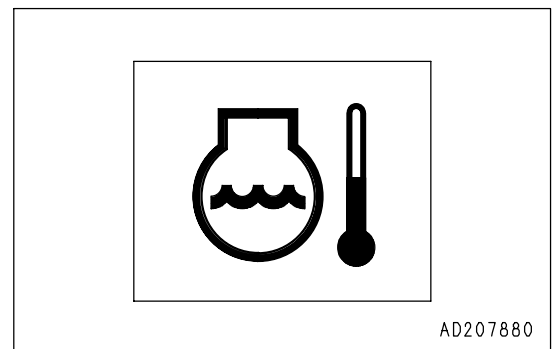
**REMARK**

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

**ENGINE COOLANT TEMPERATURE CAUTION LAMP**

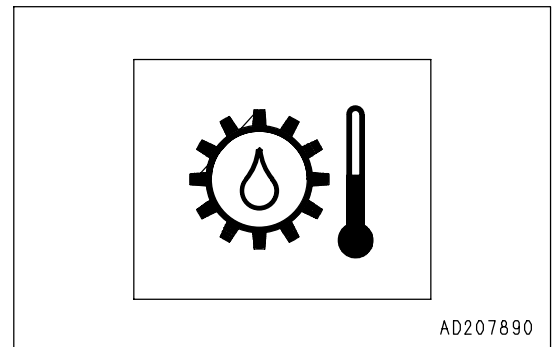
This lamp (2) indicates a raise in the coolant temperature.

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

**POWER TRAIN OIL TEMPERATURE CAUTION LAMP**

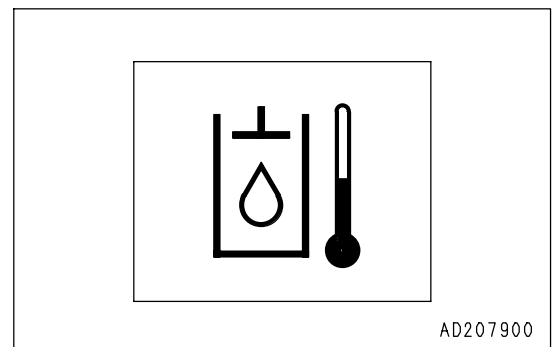
This lamp (3) indicates a rise in the oil temperature of the torque converter outlet.

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

**HYDRAULIC OIL TEMPERATURE CAUTION LAMP**

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

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



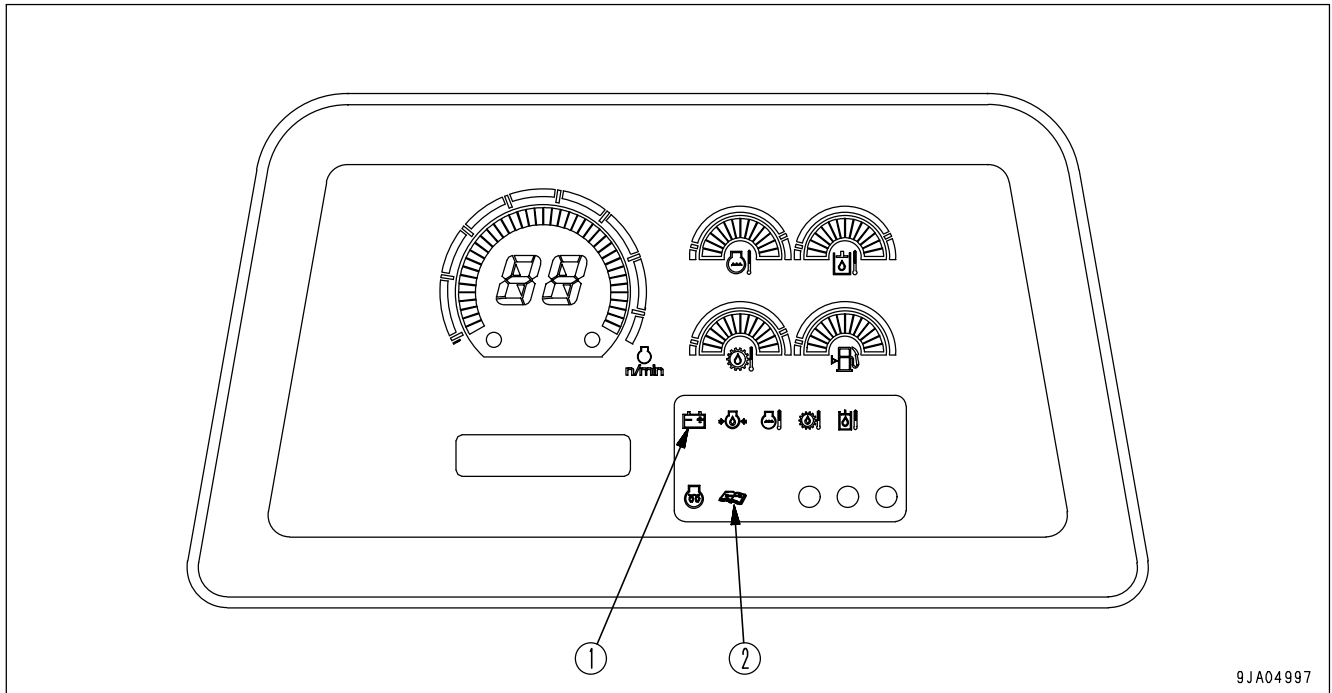


CAUTION ITEMS

**CAUTION**

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

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



9JA04997

(1) Charge level monitor

(2) Maintenance caution lamp

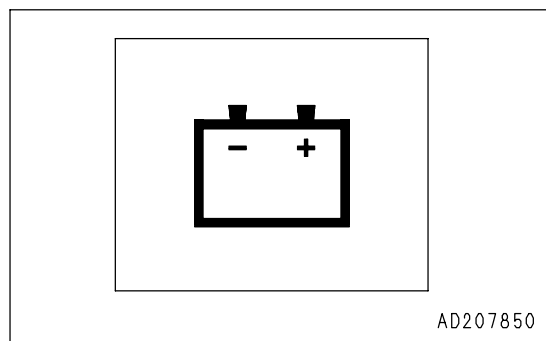
**BATTERY CHARGE CIRCUIT CAUTION LAMP**

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

If the monitor lamp flashes, check the V-belt tension. If any problem is found, see "OTHER TROUBLE (PAGE 3-132)".

**REMARK**

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



AD207850

**MAINTENANCE CAUTION LAMP**

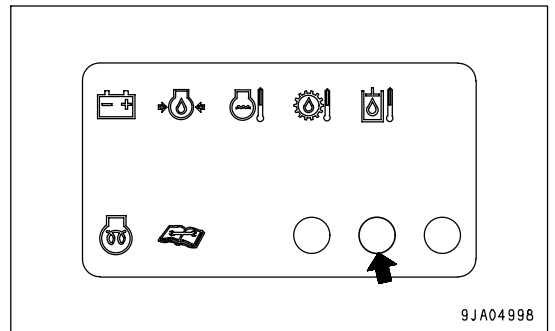
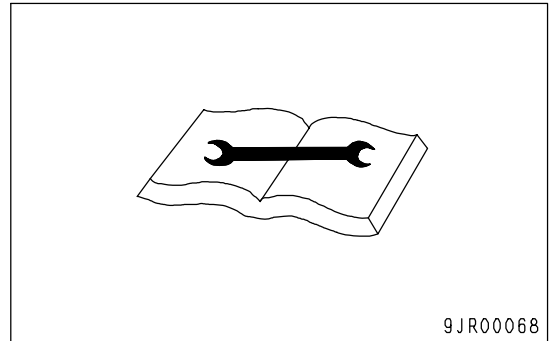
This lamp (2) lights up for approx. 30 seconds after the starting switch is turned to the ON position if the filter or oil replacement interval has been reached.

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

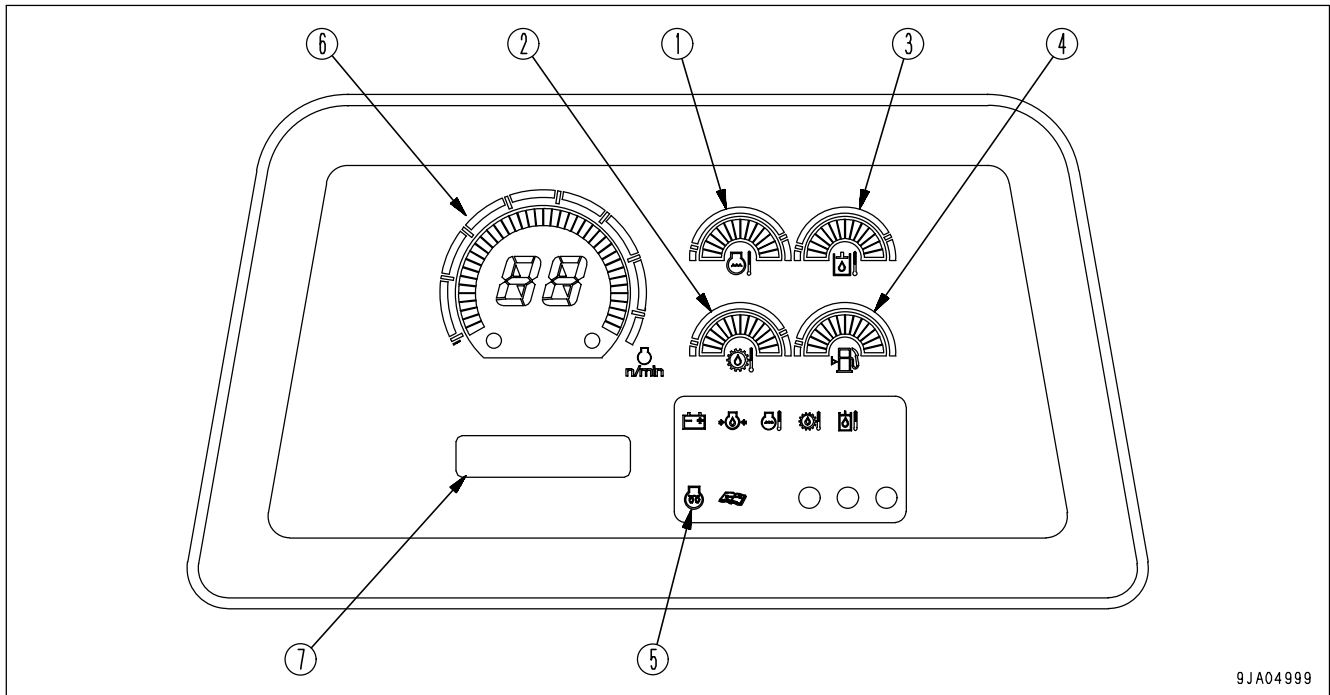
The lamp goes out.

**REMARK**

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



METER GROUP



9JA04999

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

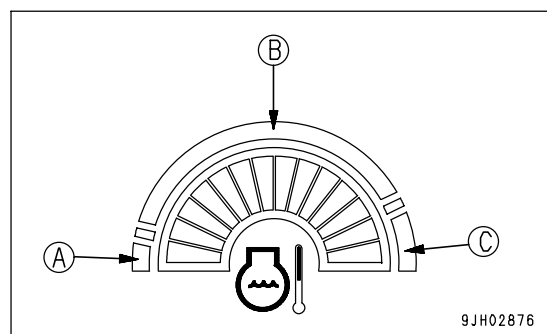
ENGINE COOLANT TEMPERATURE GAUGE

NOTICE

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

Gauge (1) indicates temperature of the engine coolant.  
 If the temperature is normal during operation, green range (B) will light.  
 If red range (C) lights during operation, move the fuel control dial to lower engine speed to approx. 3/4 of the full speed, and run until the coolant temperature enters green range (B).  
 If red range (C) lights up during operation, and the engine coolant temperature caution lamp flashes and the alarm buzzer sounds, stop the machine, run the engine at low idle, and wait for the coolant temperature to return to green range (B).

- (A): White range
- (B): Green range
- (C): Red range



9JH02876

## POWER TRAIN OIL TEMPERATURE GAUGE

### NOTICE

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

Gauge (2) indicates the torque converter outlet oil temperature. If the temperature is normal during operation, green range (B) will light.

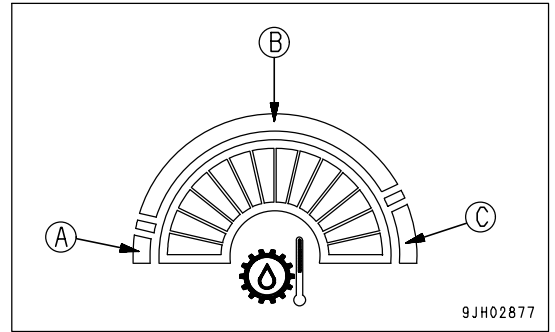
If red range (C) lights up during operation, move the fuel control dial to lower engine speed to approx. 3/4 of the full speed, reduce the load and run until the oil temperature enters green range (B).

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

(A): White range

(B): Green range

(C): Red range



## HYDRAULIC OIL TEMPERATURE GAUGE

Gauge (3) indicates the hydraulic oil temperature.

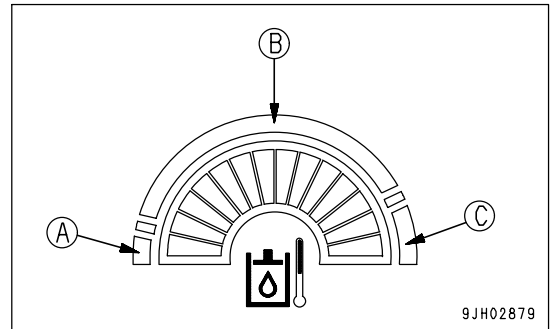
If the temperature is normal during operation, green range (B) will light.

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

(A): White range

(B): Green range

(C): Red range



## FUEL LEVEL GAUGE

Gauge (4) fuel level in the fuel tank.

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

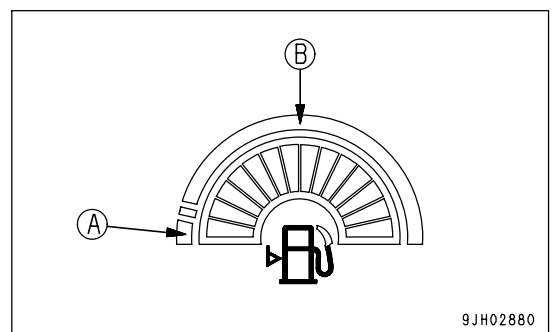
If red range (A) lights up during operation, add fuel immediately. If this is not done, the engine speed will become irregular or an error display will be shown on the monitor.

(A): Red range

(B): Green range

### REMARK

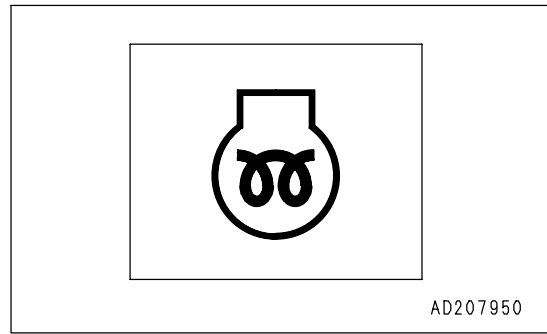
- The display is not proportional to the amount of fuel remaining.
- If only the red range (A) lights up, there is less than 60 liters (15.85 US gal) of fuel remaining.



**ENGINE PRE-HEATING PILOT LAMP**

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

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

**DISPLAY PANEL A (speed range display, engine speed)**

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

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

(A) F: FORWARD

R: REVERSE

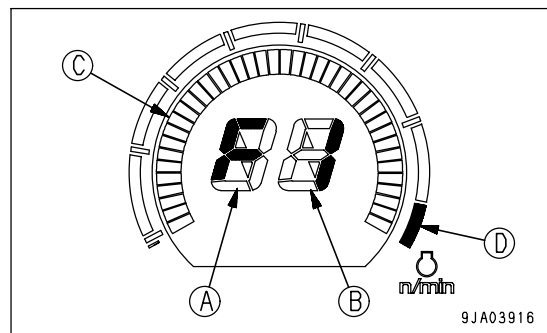
N: Neutral

P: Parking brake lever at LOCK position

(B) 1: 1st

2: 2nd

3: 3rd



Example: F1 is displayed for FORWARD 1st

- Bar graph (C) around the outside of the display shows the engine speed. If the bar graph reaches red range (D) during operation, take action to reduce the engine speed. Always keep the bar graph in the green range.

**DISPLAY PANEL B (multi-information)**

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

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

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

**OPERATING MODE (default screen)**

Use this mode when operating the machine.

**REMARK**

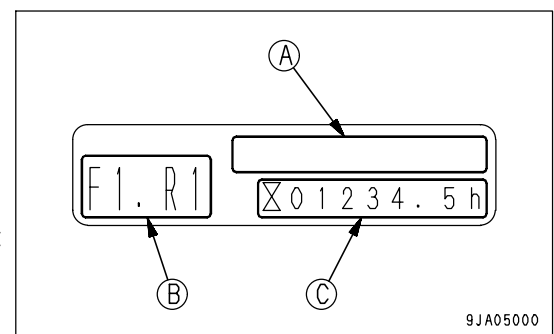
When the starting switch is turned from the OFF position to the ON position, display panel B (multi-information) always displays the operating mode.

The following information is displayed by the operating mode.

Top line (A): Action code

If any problem occurs on the machine, an action code is displayed. If an action code appears, take the applicable action. For details, see "OTHER TROUBLE (PAGE 3-132).

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



Bottom line, left (B): Preset mode

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

For details of selecting the preset mode, see "GEARSHIFTING OPERATION USING PRESET MODE FUNCTION (PAGE 3-95)".

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

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

**Service meter**

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

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

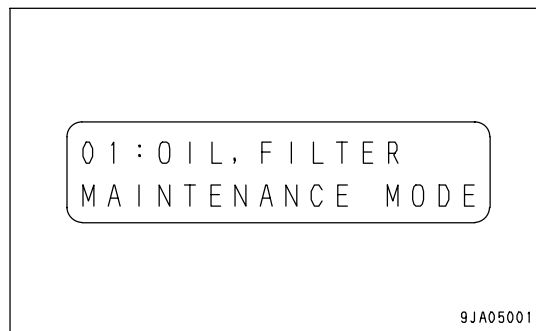
While the engine is running, the hourglass mark at the side of the meter flashes to show that the meter is advancing.

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

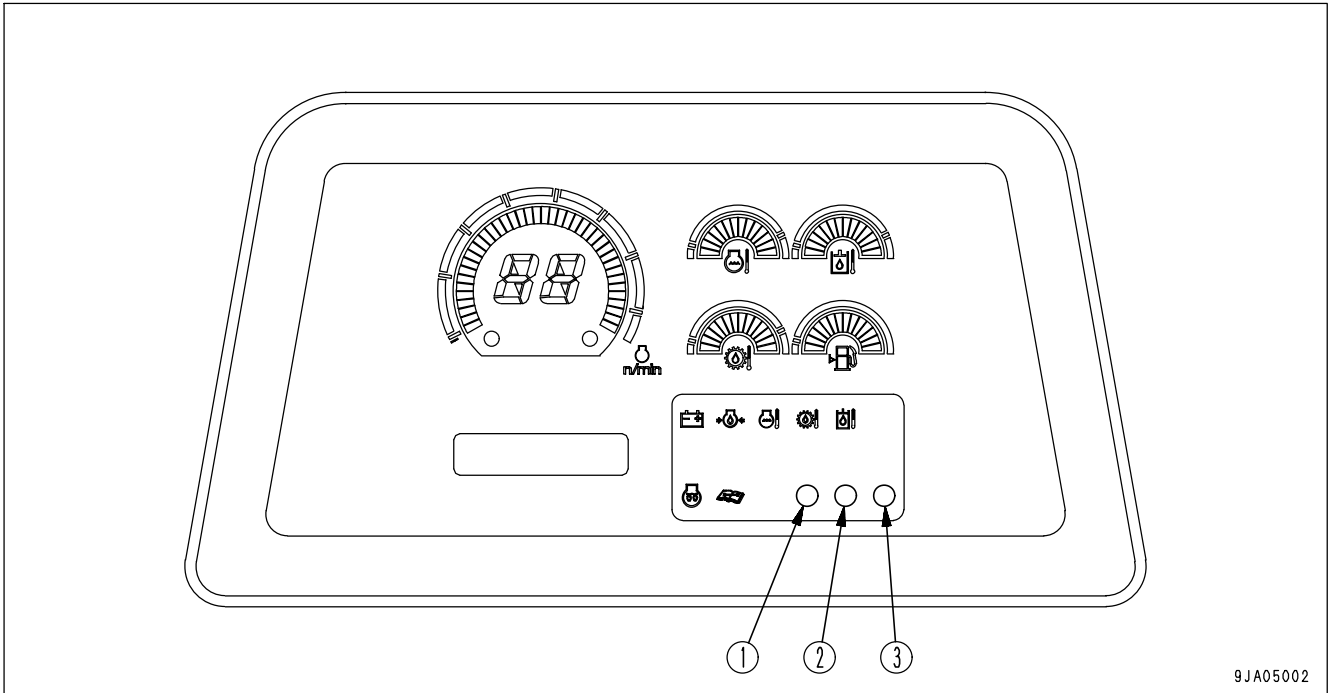
**Maintenance mode**

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

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



LAMPS



9JA05002

- (1) Warning lamp
- (2) Filter, oil change interval lamp
- (3) Fan operation confirmation lamp

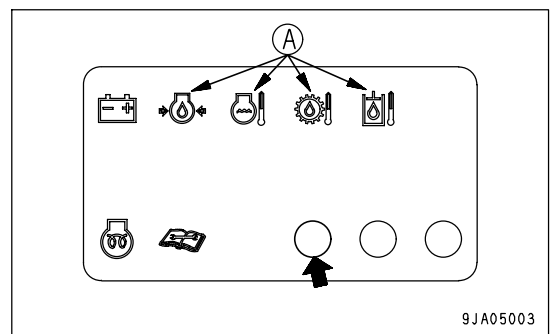
**WARNING LAMP**  
(Red)

**NOTICE**

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

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

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



9JA05003



**FILTER/OIL REPLACEMENT INTERVAL LAMP**

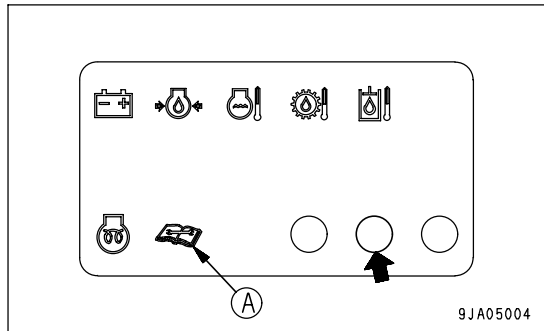
(Yellow)

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

**REMARK**

This lamp (2) lights up if there is less than 30 hours remaining until replacement, and flashes when the replacement interval has passed.

At the same time, maintenance caution lamp (A) also lights up.



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

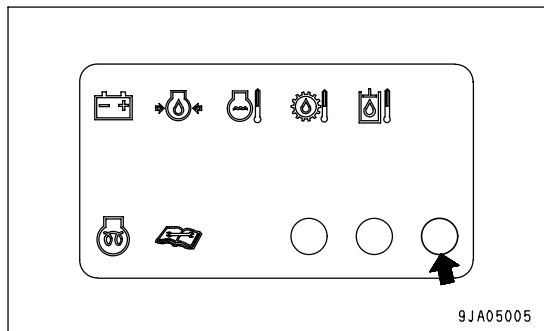
The lamp goes out or stops flashing.

**FAN OPERATION CONFIRMATION LAMP**

(Orange)

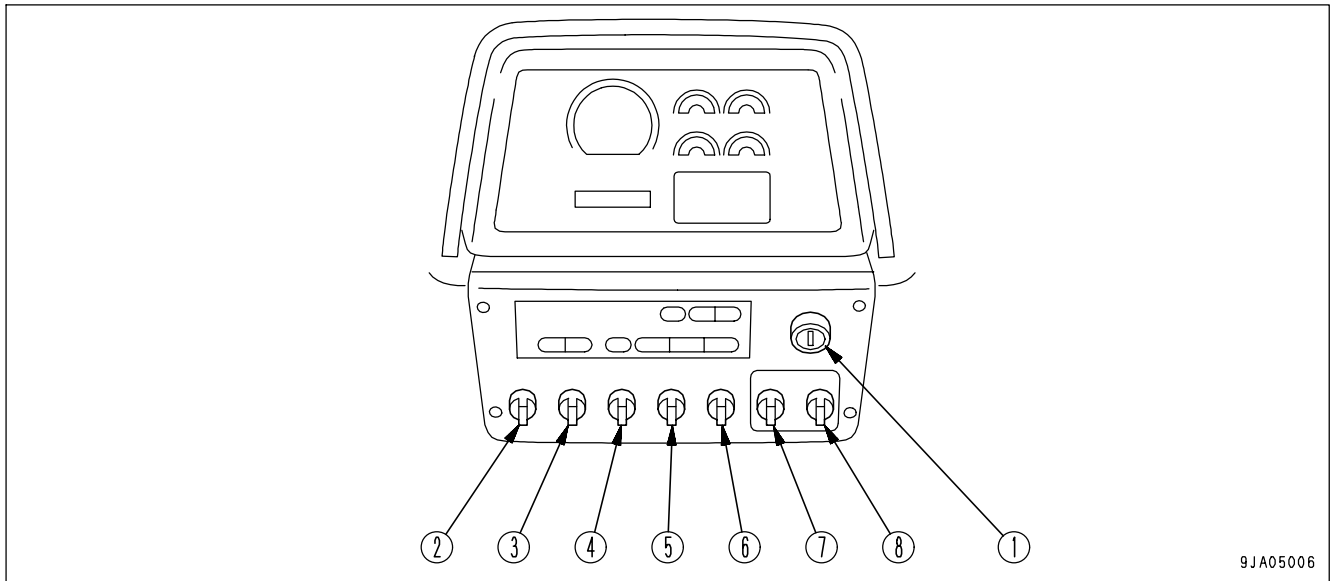
This lamp (3) flashes when the direction of fan rotation is not switched even when the switch is operated to reverse the direction of rotation of the cooling fan or when the hydraulic circuit is in protected status.

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



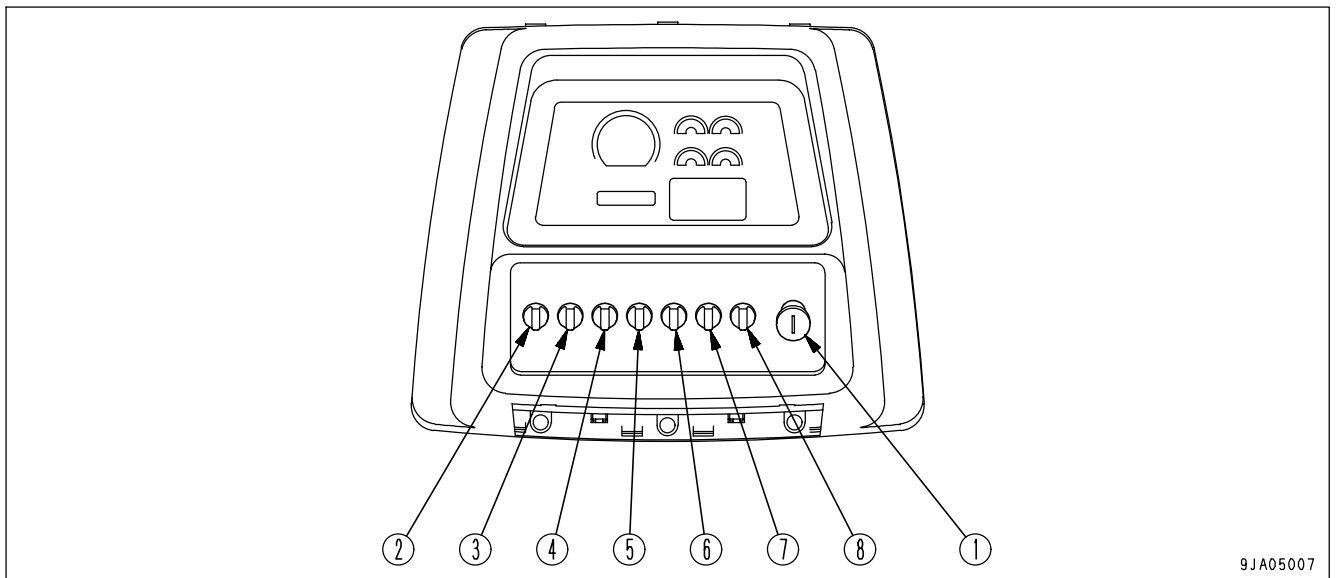
**SWITCHES**

Machine equipped with cab



9JA05006

Machine equipped with canopy



9JA05007

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

**STARTING SWITCH**

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

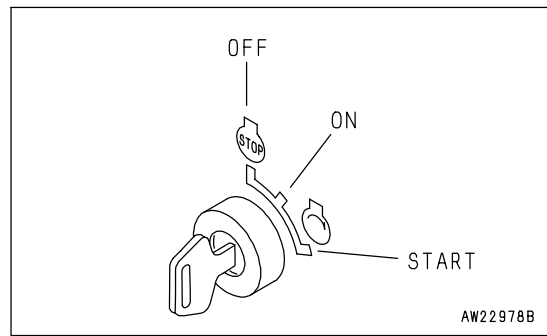
**ON position**

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 the engine. Release the key immediately after the engine has been started. The key will return to ON position when released.

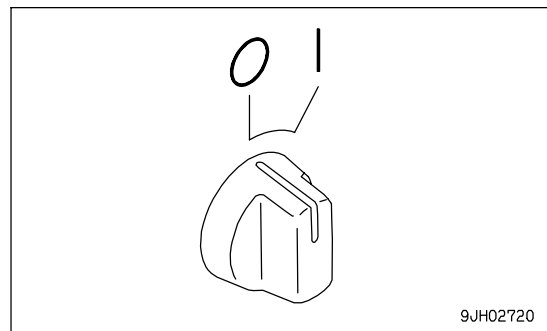
**AUTO SHIFT DOWN SWITCH**

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

Q (OFF) position: Stopped

I (ON) position: Actuated

For details, see "AUTO DOWN SHIFT OPERATION (PAGE 3-96)".

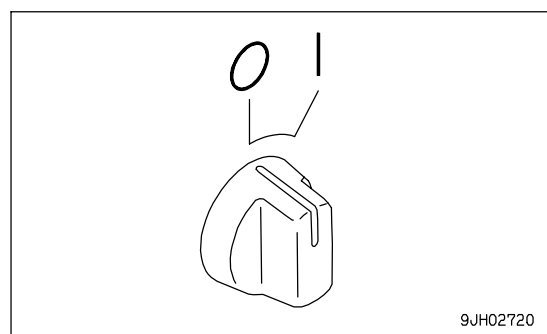
**PRESET MODE SWITCH**

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

Q (OFF) position: Stopped

I (ON) position: Actuated

For details, see "GEARSHIFTING OPERATION USING PRESET MODE FUNCTION (PAGE 3-95)".

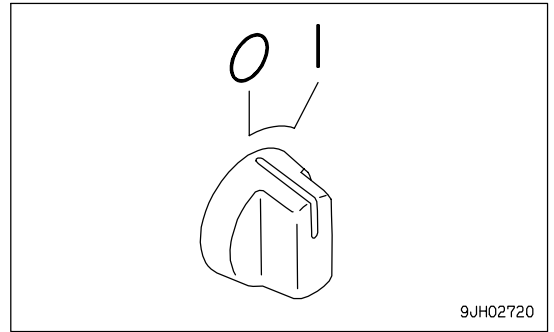


**HEAD LAMP SWITCH**

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

○ (OFF) position: Lights out

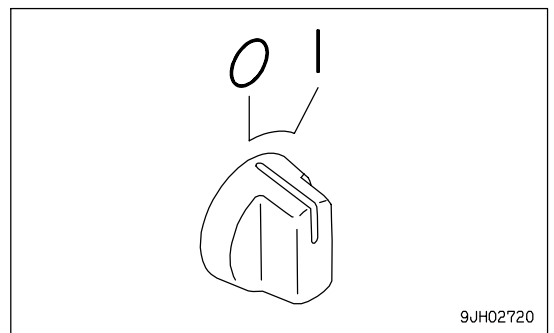
┆ (ON) position: Lights on

**REAR LAMP SWITCH**

This switch (5) lights up the rear lamps.

○ (OFF) position: Lights out

┆ (ON) position: Lights on



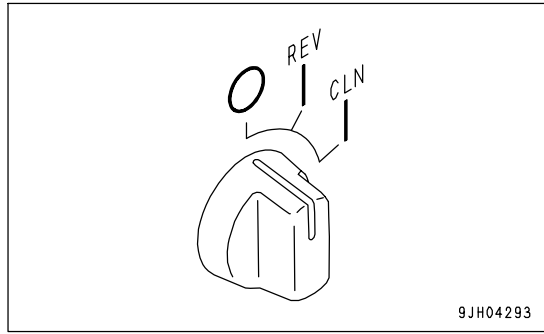
**FAN ROTATION SELECTOR SWITCH**

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

**Q** position : Normal rotation  
 Normally use this position.  
 The air is pushed out to the front through the radiator mask.  
 The speed of the fan changes to match the temperature of the coolant in order to improve the cooling efficiency.

**REV** position: Reverse rotation  
 The fan rotates in the reverse direction.  
 The air is sucked into the engine room through the radiator mask. This makes it possible to use the heat from the radiator to warm the operator's cab.  
 Operating with the fan rotating in reverse may cause overheating, so use this function only during cold weather (ambient temperature below 15°C).

**CLN** position: Cleaning  
 The fan rotates in the reverse direction at high speed, regardless of the coolant temperature.  
 Use this function to clean the radiator fins.

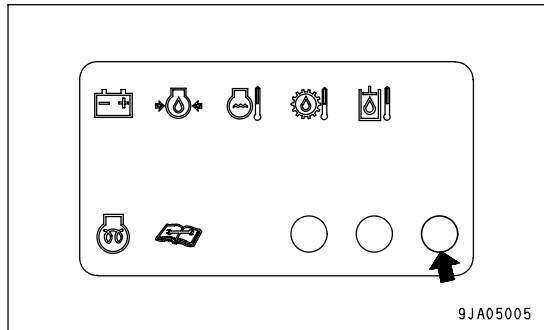


9JH04293

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

**REMARK**

- If the engine is running, the direction of rotation of the fan will not change even when the fan rotation selector switch is operated. The fan operation confirmation lamp will flash to inform the operator that the direction of rotation of the fan has not changed. Stop the engine, then start it again. The direction of rotation of the fan will be switched.
- When the cooling fan is being operated in reverse or in the cleaning mode, even if the starting switch is turned to the OFF position, the hydraulic circuit protection function will be actuated and the power supply will not be cut immediately. During this time, the fan operation confirmation lamp will flash to inform the operator that the power supply is being maintained.



9JA05005

**INFORMATION SWITCH**

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

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

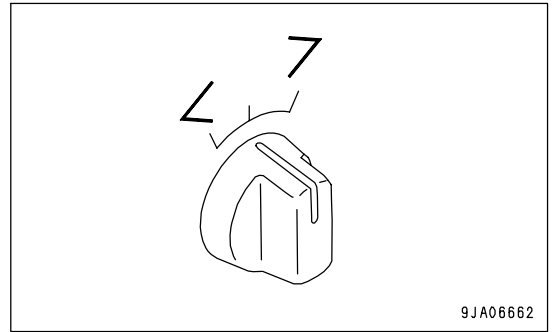
- **When display panel B (multi-information) is in the operation mode**

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

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

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

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

**BUZZER CANCEL SWITCH**

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

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

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

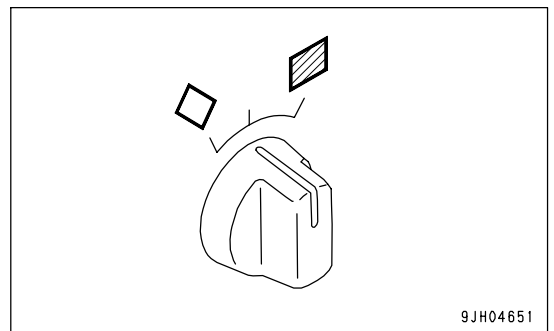
- When the alarm buzzer is sounding, turn this switch to the left or right to stop the buzzer.
- If the switch is held at the U position for at least 2.5 seconds, the display switches to the maintenance mode.

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

⌘ position: Cancel or reset to operation mode

U position: Confirms selection or selected item

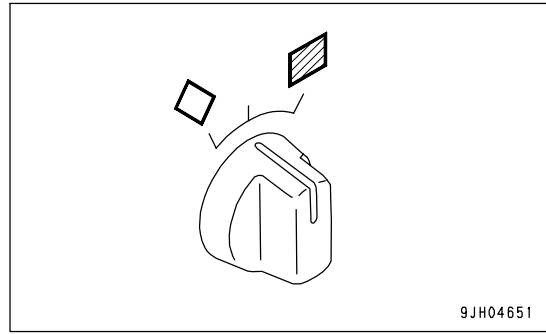
For details, see "METHOD OF USING MAINTENANCE MODE (PAGE 3-24)".



**METHOD OF USING MAINTENANCE MODE**

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

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

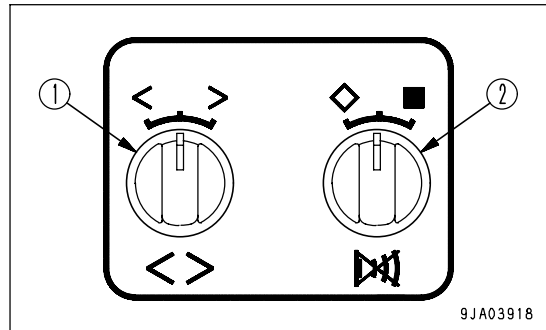


**EXPLANATION OF MODES AND OPERATION**

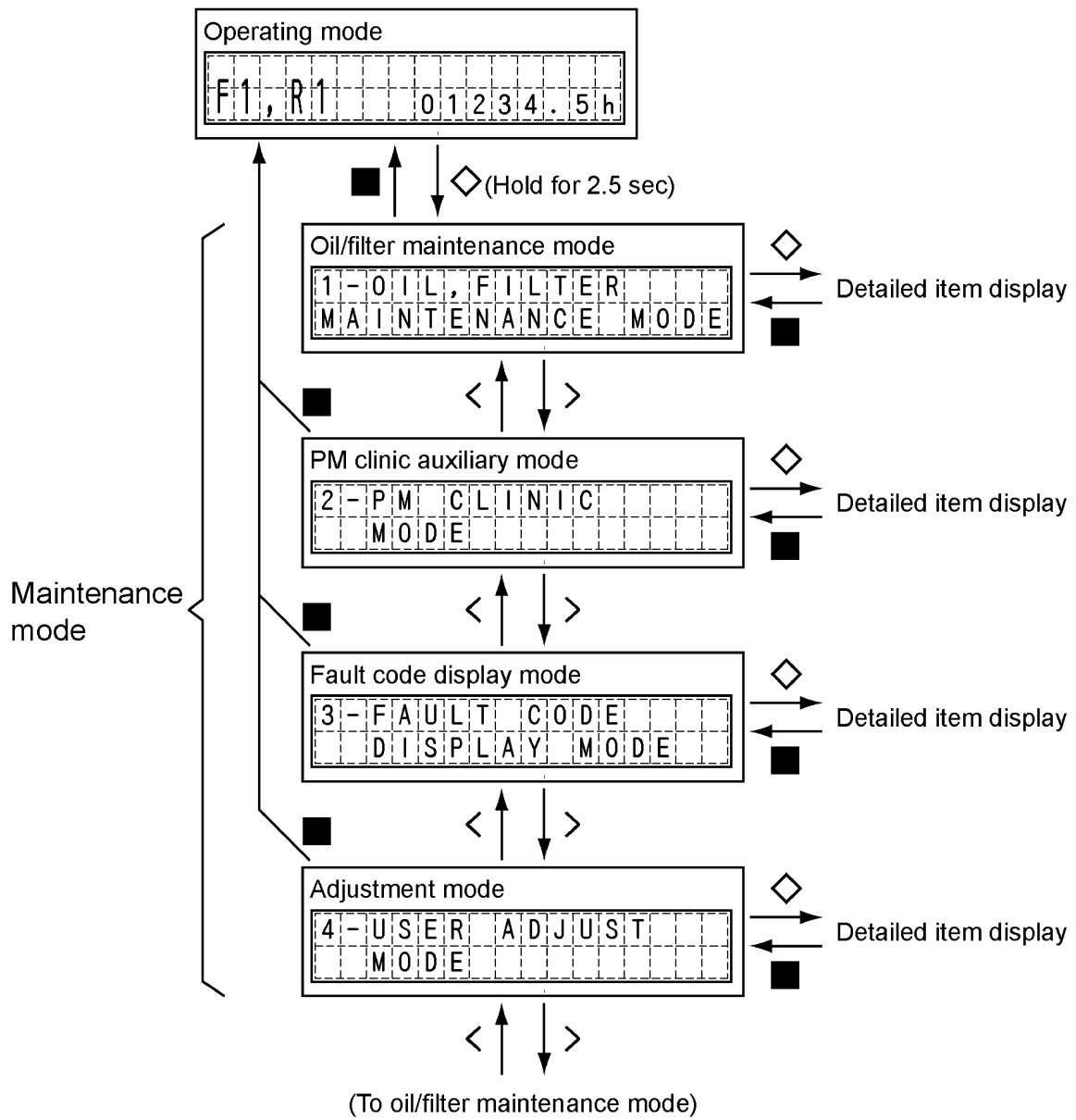
The maintenance mode has the following 4 sub modes.

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

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



METHOD OF SELECTING EACH MODE





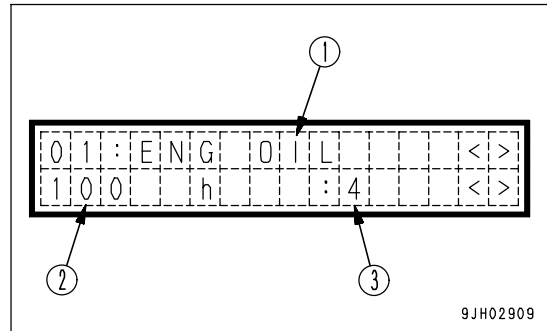
METHOD OF USING OIL AND FILTER MAINTENANCE MODE

NOTICE

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

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

- (1) The item is displayed.
- (2) The time remaining until replacement is displayed.
- (3) The quantity of replacements until now is displayed.



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

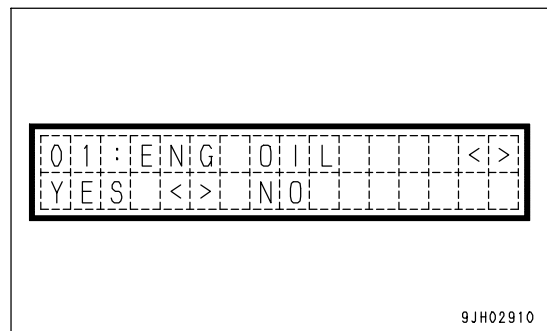
	Display	Item	Replacement Interval
1.	ENG.OIL	Engine oil	500h
2.	ENG.FLT	Engine oil filter	500h
3.	FUEL.FLT	Fuel filter	500h
4.	HYD.FLT	Hydraulic oil filter	2000h
5.	CORR.FLT	Corrosion resistor	1000h
6.	BYPS.FLT	Bypass filter (*)	0h
7.	DAMP.OIL	Damper oil	2000h
8.	OIL	Final drive oil	1000h
9.	HYD.OIL	Hydraulic oil	2000h
10.	POWL.OIL	Power train oil	1000h
11.	POWL.FLT	Power train oil filter	500h
12.	HSS.FLT	HSS charge filter (*)	0h

(\*) Although the marked item is displayed, it is not used with this machine.

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

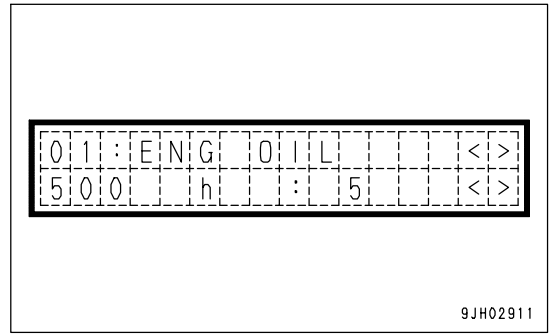
The screen will ask if you want to display the replacement history. Operate the information switch to select YES, then operate the buzzer cancel switch to U. The replacement quantity will increase by 1, the replacement interval will be reset, and the oil, filter change interval lamp will go out.

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



**REMARK**

To return to the maintenance mode, operate the buzzer cancel switch to  $\bar{t}$ .



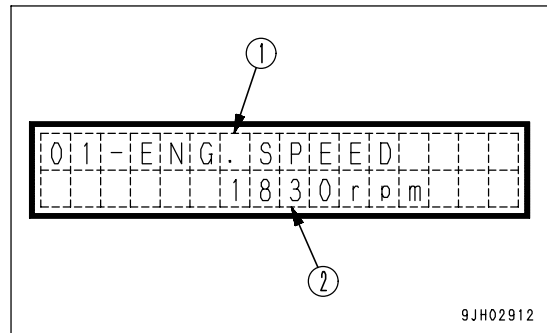
9JH02911

METHOD OF USING PM CLINIC AUXILIARY MODE

**CAUTION**

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

The PM clinic auxiliary mode displays the engine speed or hydraulic pressure on display panel B (multi-information). Display panel B displays the item on the top line (1) and the measured value on the bottom line (2).



The display items consist of the four items in the table below. The items can be selected by operating the information switch (<, >).

Display	Item	Measured value
01-ENG.SPEED	Engine speed	Speed (rpm)
02-BOOST PRESSURE	Boost pressure	Pressure (kPa)
03-HYD.PUMP PRES	Hydraulic oil pressure	Pressure (MPa)*
04-BATTERY VOLT	Battery voltage	Voltage (V)

\* 0.0 MPa is shown as the value for hydraulic oil pressure of the work equipment, as this machine is not equipped with a sensor for this purpose.

**REMARK**

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

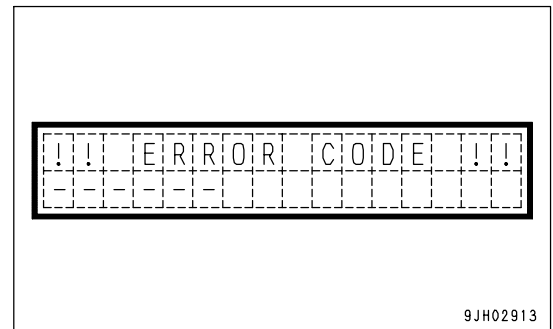
## METHOD OF USING FAULT CODE DISPLAY MODE

## NOTICE

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

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

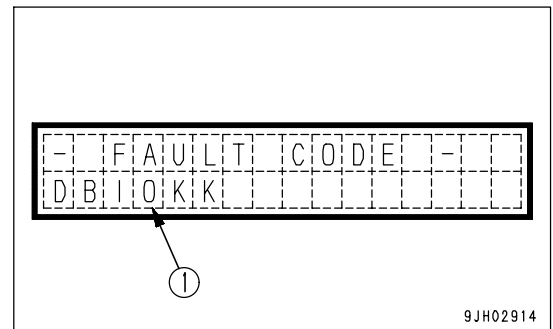
If the failure observation function has not determined the condition of the machine, the display is as shown in the diagram on the right.



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

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

The display is shown repeatedly.



## REMARK

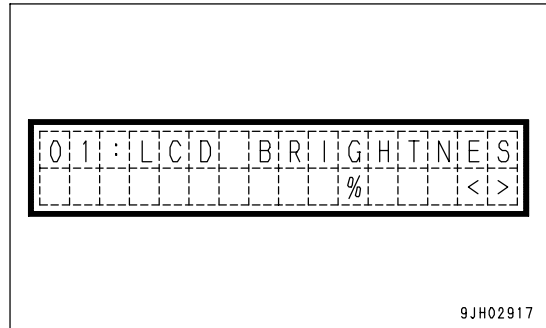
To return to the maintenance mode, operate the buzzer cancel switch to  $\bar{t}$ .

**METHOD OF USING USER ADJUST MODE**

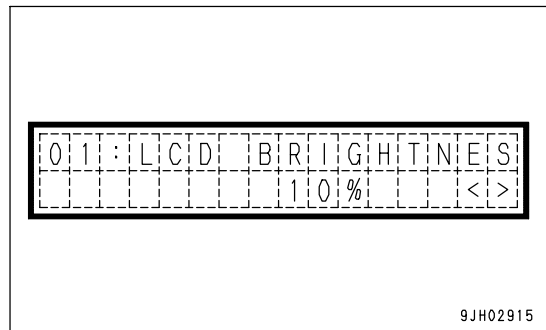
With the user adjust mode, the brightness of the panel screen backlighting and the contrast of the liquid crystal panel can be changed.

1. Adjusting backlighting of liquid crystal display

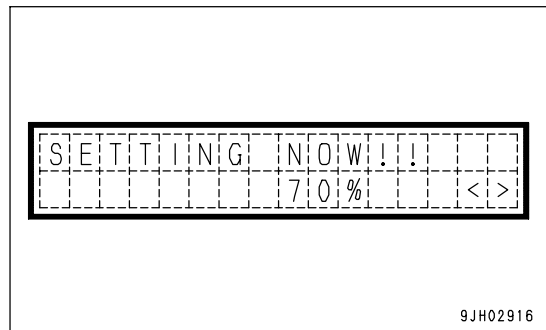
1) The diagram on the right is the mode for adjusting the brightness of the backlighting of the liquid crystal panel. This display will be switched to the screen brightness adjustment display, if the alarm buzzer cancellation switch is turned to the U position.



2) The brightness can be adjusted by operating the information switch. The higher the number, the brighter the screen becomes; the lower the number, the darker the screen becomes.  
> position: Number increases  
< position: Number decreases



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



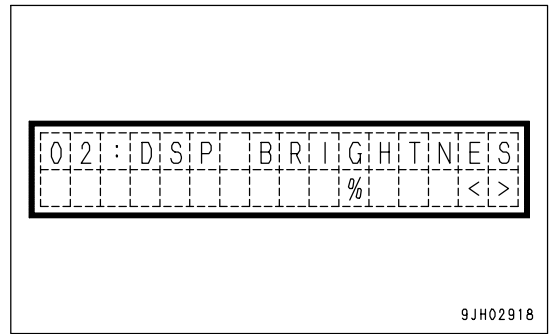
**REMARK**

- To return to the maintenance mode, operate the buzzer cancel switch to t .
- The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lit or not. Entering this mode when the front lamps are lit makes it possible to adjust the brightness when the front lamps are lit. In the same way, entering this mode when the front lamps are not lit makes it possible to adjust the brightness when the front lamps are not lit.

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

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

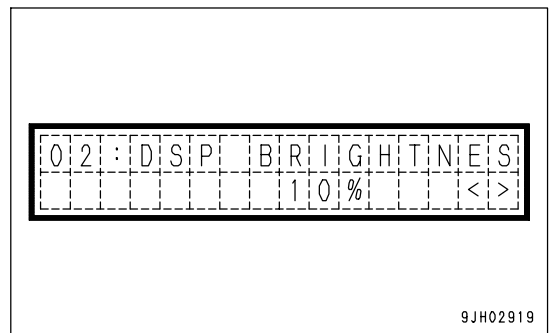
On the screen, operate the buzzer cancel switch to U to switch to the screen for adjusting the brightness.



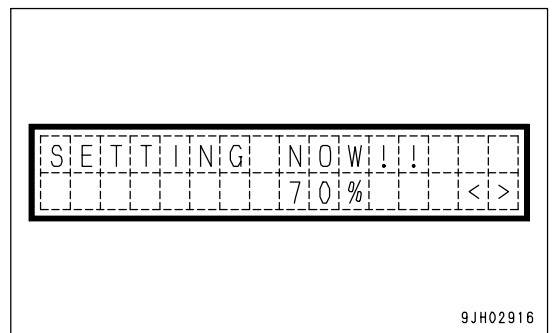
2) The brightness can be adjusted by operating the information switch.

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

- > position: Number increases
- < position: Number decreases



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



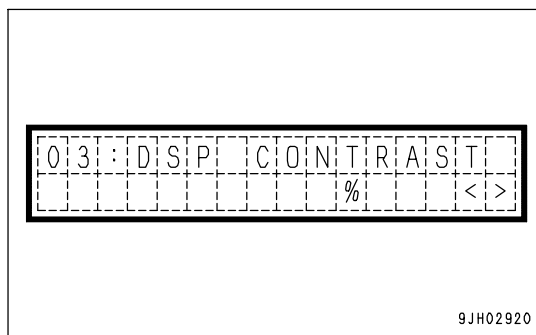
**REMARK**

- To return to the maintenance mode, operate the buzzer cancel switch to t.
- The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lit or not. Entering this mode when the front lamps are lit makes it possible to adjust the brightness when the front lamps are lit. In the same way, entering this mode when the front lamps are not lit makes it possible to adjust the brightness when the front lamps are not lit.

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

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

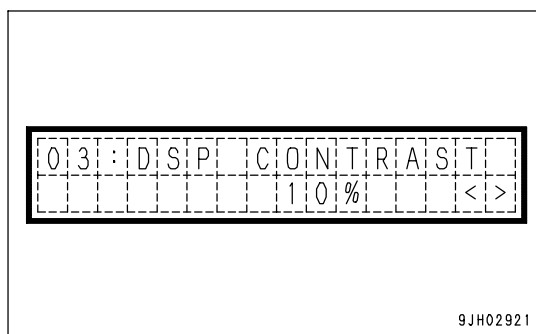
On this screen, operate the buzzer cancel switch to U to switch to the screen to adjust the contrast.



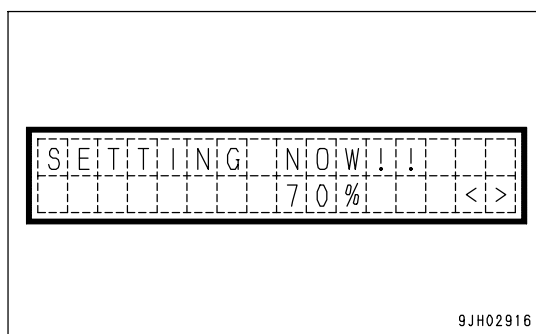
2) The contrast can be adjusted by operating the information switch.

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

- > position: Number increases
- < position: Number decreases



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

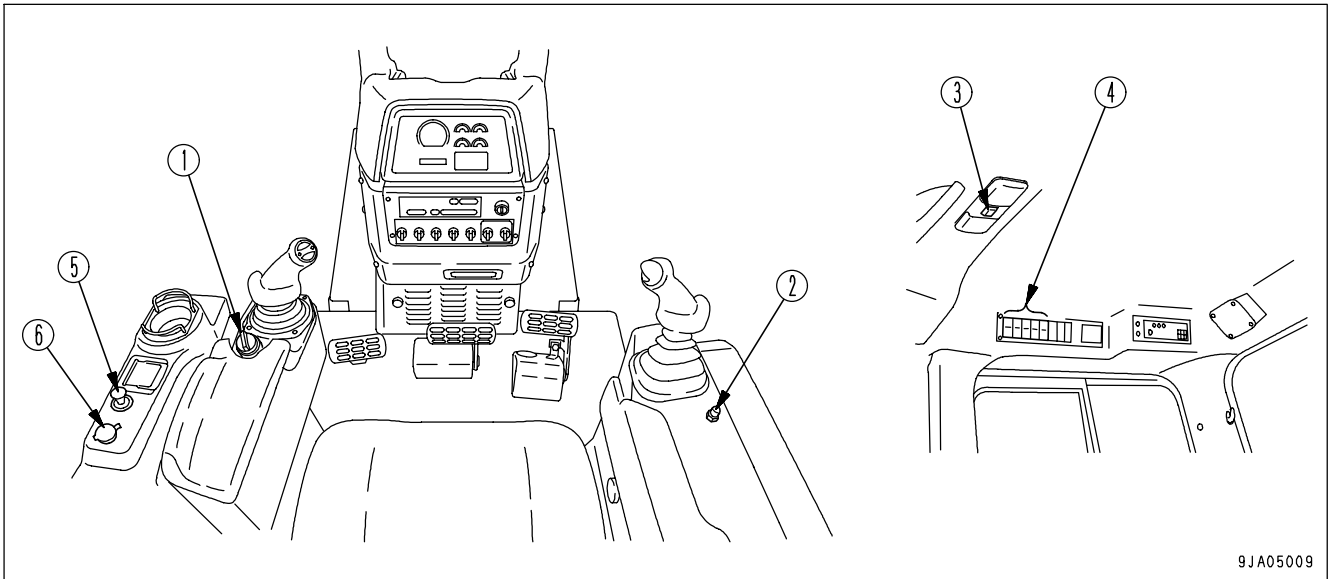


**REMARK**

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

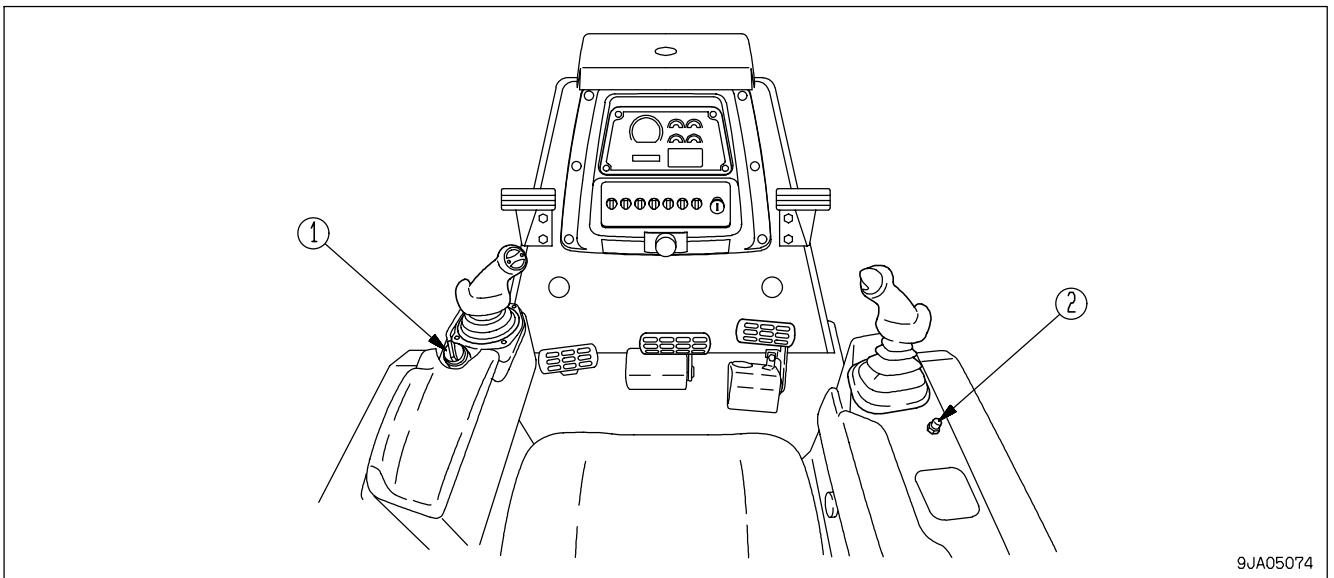
SWITCHES

Machine equipped with cab



9JA05009

Machine equipped with canopy



9JA05074

- (1) Fuel control dial
- (2) Horn switch
- (3) Room lamp switch

- (4) Wiper switch
- (5) Cigarette lighter
- (6) Accessory socket

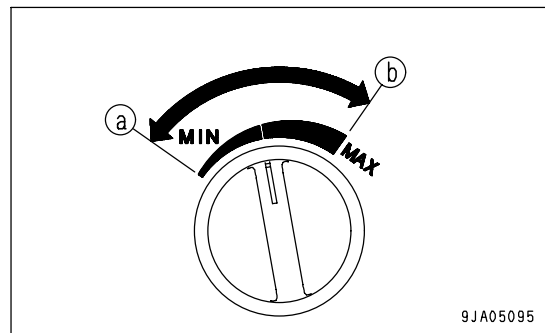


**FUEL CONTROL DIAL**

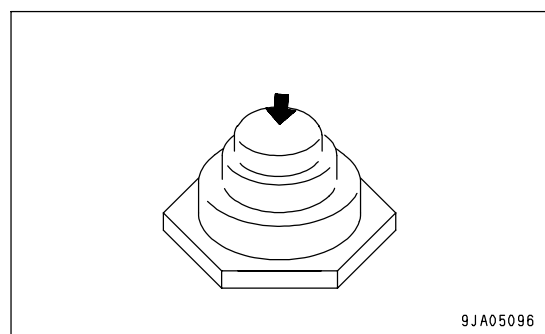
Dial (1) is used to control the engine speed and output.

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

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

**HORN SWITCH**

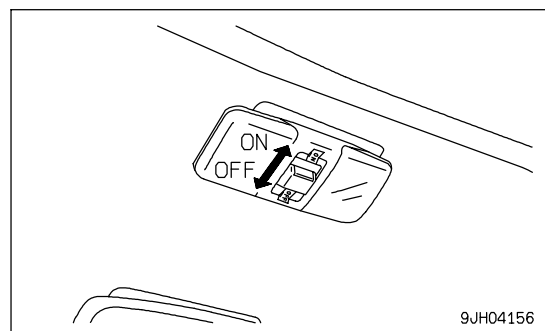
The horn sounds when the button (2) at the rear of the blade control lever at the right side of the operator's seat is pressed.

**ROOM LAMP SWITCH**

This (3) illuminates the room lamp.

OFF position: Lamps are out

ON position: Lamps light up

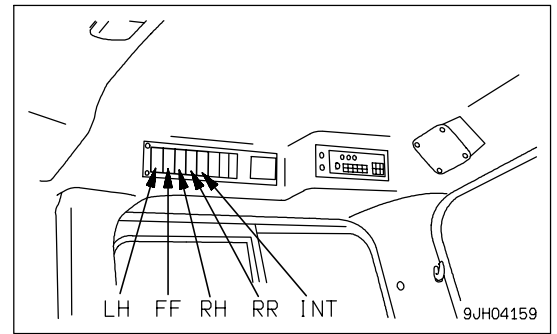


**WIPER SWITCH**

This (4) activates the wipers.

The wiper switches are as follows:

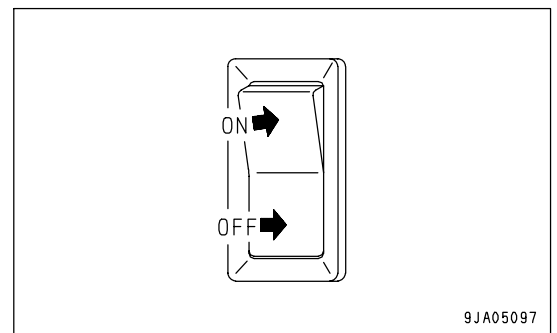
- (LH) Left door
- (FF) Front window
- (RH) Right door
- (RR) Rear window
- (INT) Wiper intermittent operation switch



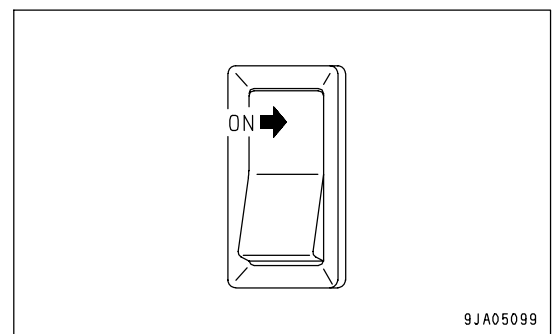
This is also used as the window washer switch.

The switch is operated as follows.

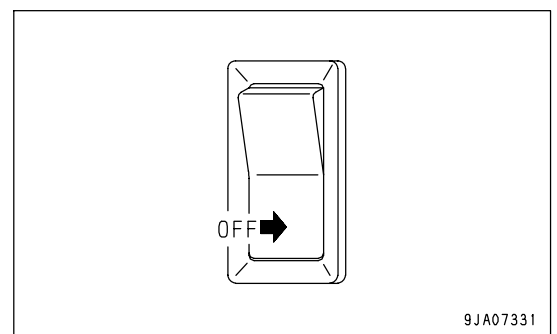
- Wiper only
  - ON position: Wiper is operated
  - OFF position: Wiper stops



- Wiper and window washer
  - If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.



- Window washer only
  - Keep the switch pressed to the OFF position to spray out water.

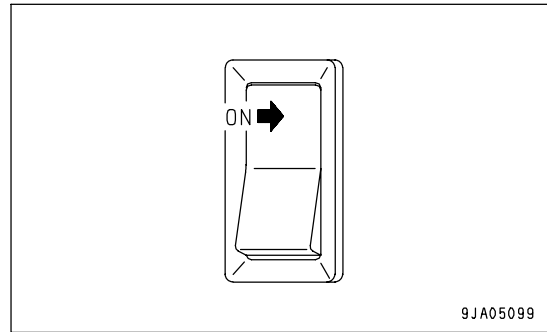


- Wiper intermittent operation switch

If the wiper is operated with the switch at the ON position, the wiper will move once every four seconds.

#### REMARK

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



#### CIGARETTE LIGHTER

This (5) is used to light cigarettes.

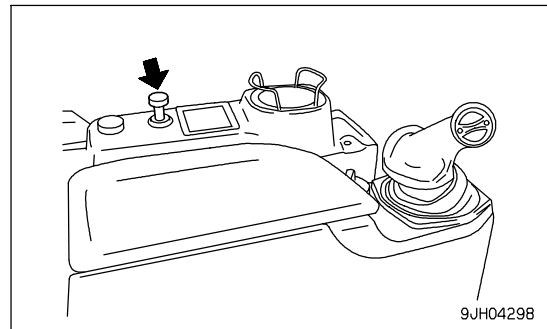
When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette.

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

#### NOTICE

This cigarette lighter is 24V. Do not use it as the power source for 12V equipment. If it is used so, the equipment may fail.

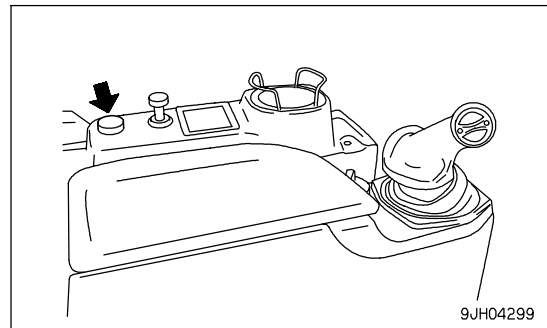
The capacity of the cigarette lighter is 120W (24V x 5A).



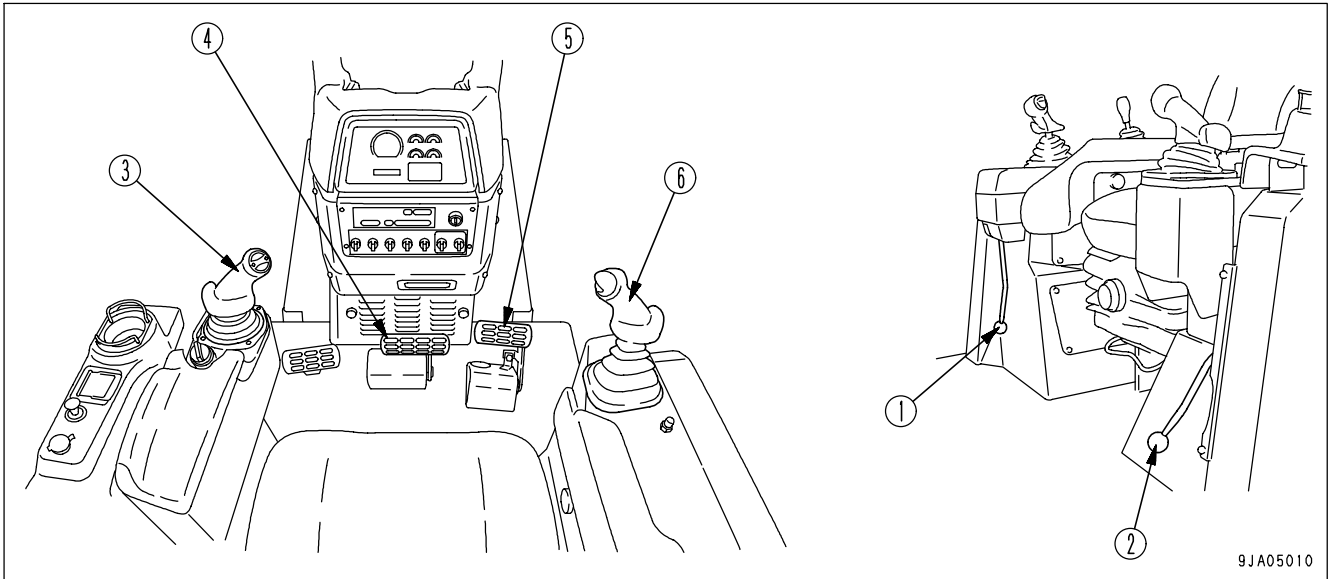
#### ACCESSORY SOCKET

This (6) is used as the power source for a wireless or other 12V equipment.

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



**CONTROL LEVERS AND PEDALS**



- |   |                         |
|---|-------------------------|
| (1) Work equipment lock lever                             | (4) Brake pedal         |
| (2) Parking brake lever                                   | (5) Deceleration pedal  |
| (3) Joystick (steering, directional and gear shift lever) | (6) Blade control lever |

**WORK EQUIPMENT LOCK LEVER**

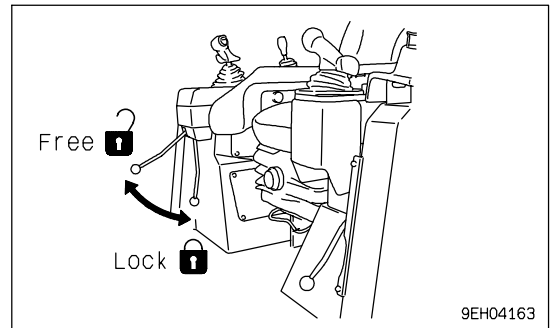


- When leaving the operator's compartment, set the work equipment lock lever securely to the LOCK position. If the work equipment lock lever is not at the LOCK position and the control levers are touched by mistake, it may lead to serious personal injury.
- If the work equipment lock lever is not set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

This lever (1) is a lock device for the work equipment control levers. When it is set to the LOCK position, operation of the work equipment is locked.

**REMARK**

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



## PARKING BRAKE LEVER



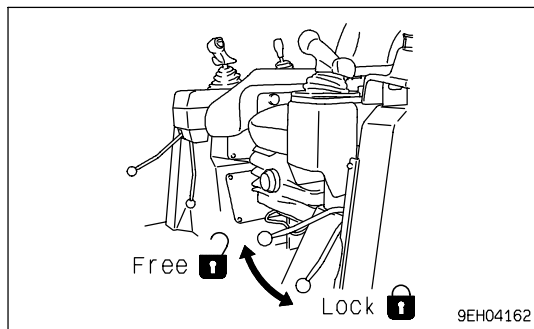
### WARNING

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

This lever (2) operates the parking brake. The parking brake is applied when it is in the LOCK position.

#### REMARK

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



## STEERING, FORWARD-REVERSE, GEAR SHIFT LEVER

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

#### • Forward-reverse shifting

Position (a): FORWARD

Position (b): REVERSE

Position N: Neutral

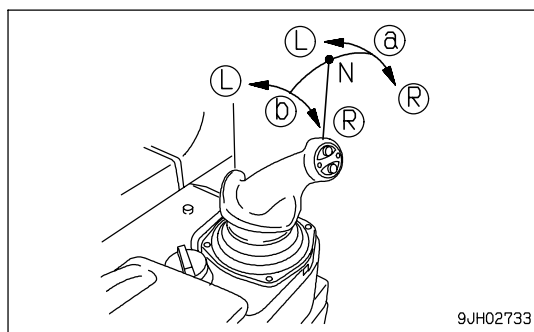
Move to the front to drive forward; move to the rear to drive in reverse.

#### • Steering

Position (L): Left turn

Position (R): Right turn

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



#### REMARK

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

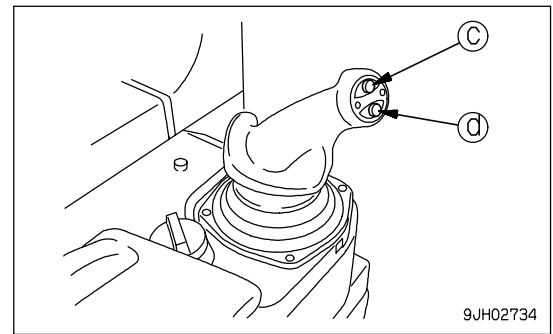
### • Gear shifting

When switch (c) or switch (d) is pushed, the transmission speed will change.

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

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

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



9JH02734

### REMARK

The speed range being used is displayed on panel A on the monitor panel according to the gearshift operation.

<Example>

Neutral: N is displayed on the display panel.

FORWARD 2nd: F2 is displayed on the display panel.

REVERSE 3rd: R3 is displayed on the display panel.

When the parking brake lever is locked, P is displayed. \T

- For details of the method of shifting gears according to the shift mode, see the "SHIFTING GEARS (PAGE 3-94)". Shift mode selection means that the selected speed range is displayed at the NEUTRAL position (N) before starting.

### • Operating counterrotation turn



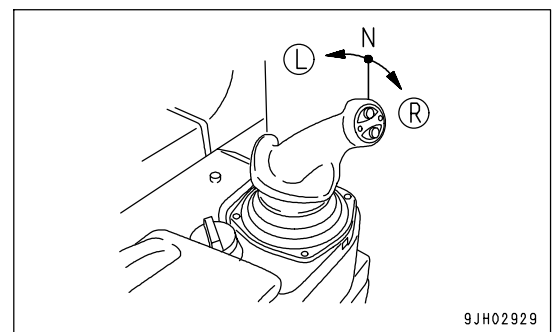
## WARNING

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

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

(R): Right counterrotation turn

(L): Left counterrotation turn

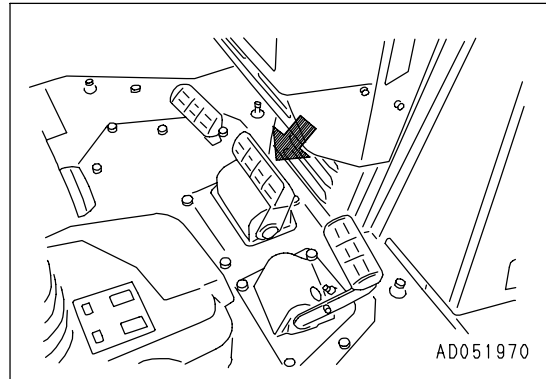


9JH02929

**BRAKE PEDAL****WARNING**

Do not place your foot on this pedal unnecessarily.

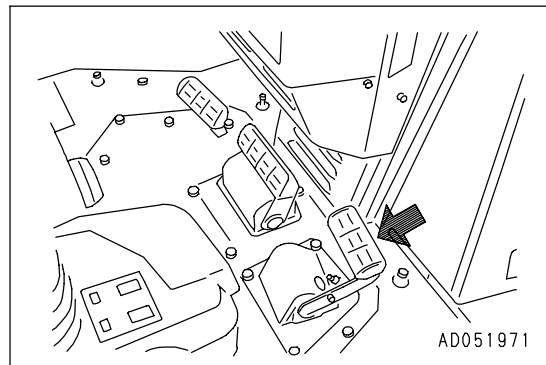
Depress the pedal (4) to apply the right and left brakes.

**DECELERATOR PEDAL****WARNING**

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

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

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



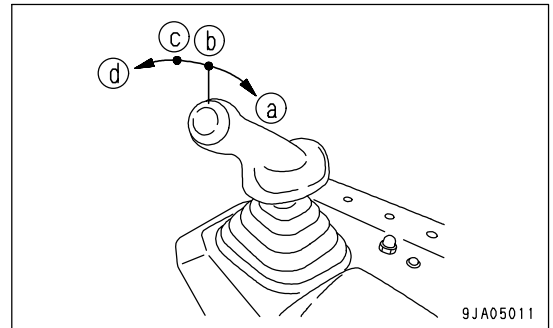
**BLADE CONTROL LEVER**

**POWER TILTDOZER**

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

- Lifting control

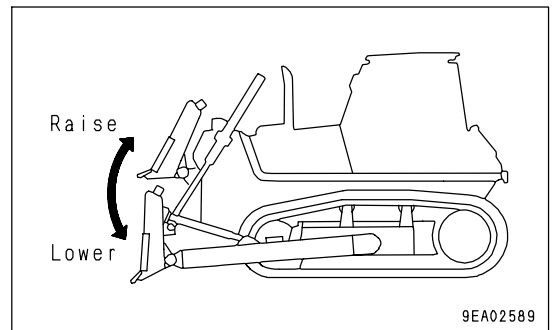
- (a) RAISE:
- (b) HOLD: Blade is stopped and held in this position.
- (c) LOWER:
- (d) FLOAT: Blade will move freely according to external force.



9JA05011

**REMARK**

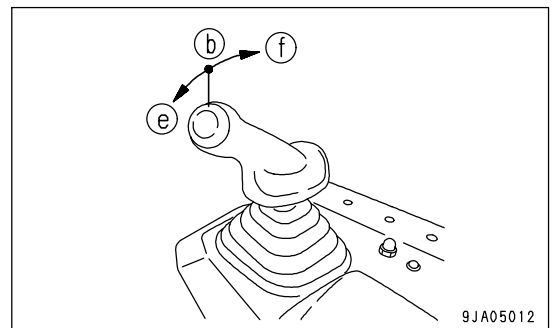
- If the lever is in the FLOAT position, even when it is released, it does not return to the HOLD position, so return it by hand.
- If the engine is stopped when the control lever is in the FLOAT position, the lever is returned automatically to the HOLD position.
- In low temperatures, it may take a short time for the blade control lever to be held in the FLOAT position, so hold the lever in position for at least 1 second.



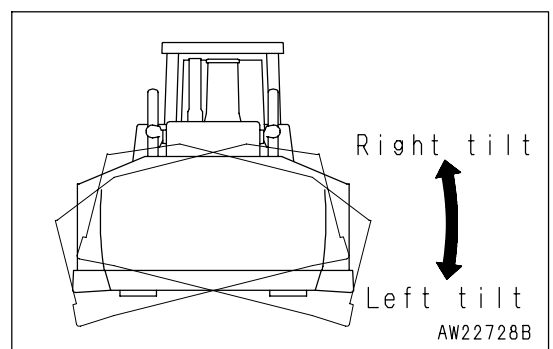
9EA02589

- Tilting control

- (b) HOLD: Blade is stopped and held in this position.
- (e) LEFT TILT
- (f) RIGHT TILT



9JA05012



AW22728B

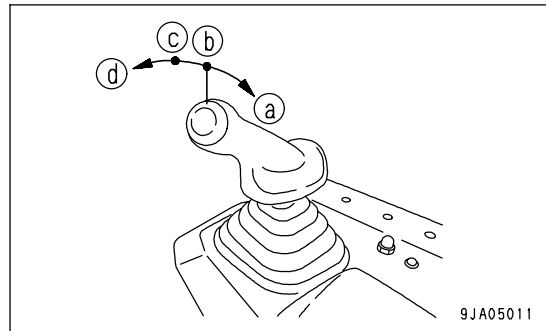


**POWERTILT POWER PITCHDOZER**

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

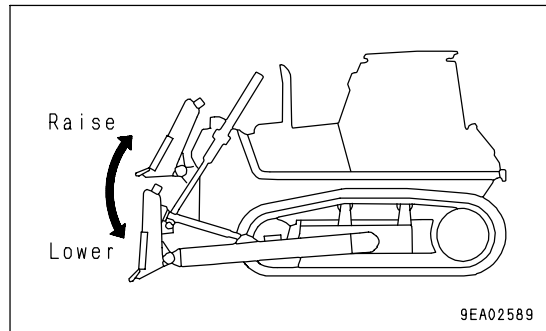
- Lifting control

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



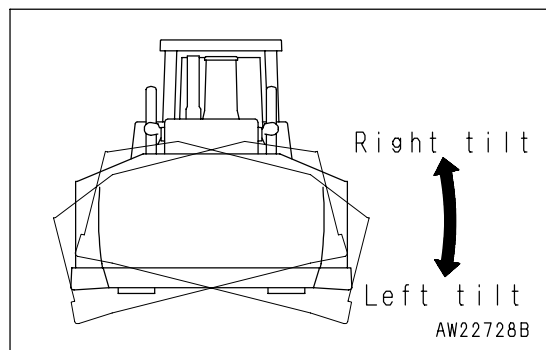
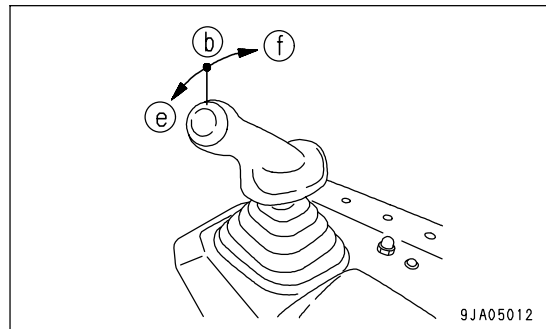
**REMARK**

- If the lever is in the FLOAT position, even when it is released, it does not return to the HOLD position, so return it by hand.
- If the engine is stopped when the control lever is in the FLOAT position, the lever is returned automatically to the HOLD position.
- In low temperatures, it may take a short time for the blade control lever to be held in the FLOAT position, so hold the lever in position for at least 1 second.



- Tilting control

- (b) HOLD: Blade is stopped and held in this position.
- (e) LEFT TILT
- (f) RIGHT TILT



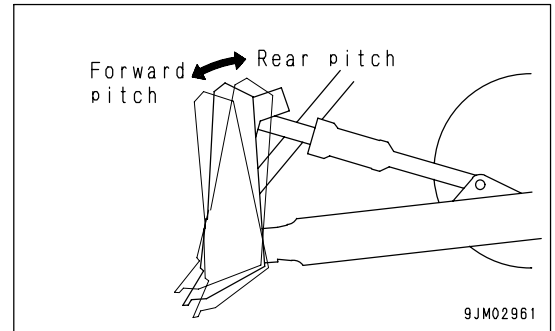
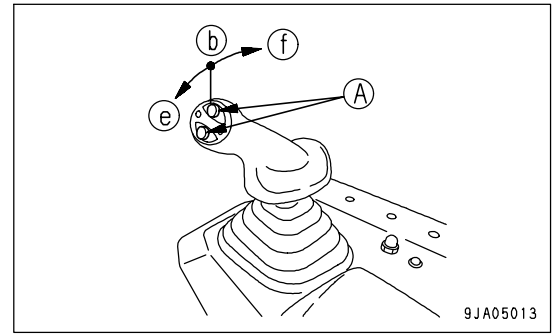
• Pitch control

First set the lever to the neutral position, then keep switch (A) in the center of the knob pushed down and carry out the tilt operation to change the cutting angle of the blade.

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

(e) REAR PITCH: Min. digging angle

(f) FORWARD PITCH: Max. digging angle

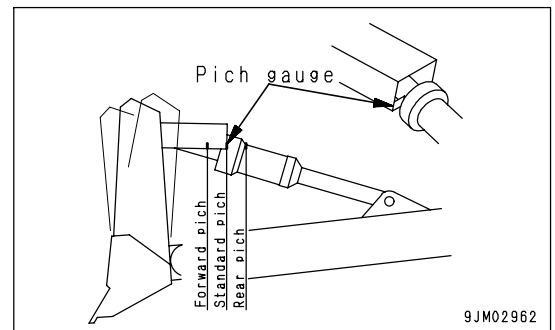


• Precautions when using pitch control

When using the pitch operation, the tilt operation changes as follows.

(D65PX)

Pitch condition	Tilt operation	Amount of tilt
Max. forward pitch	Only left tilt operation is possible	Max. 890 mm (35.1 in)
Forward pitch	Both left and right tilt operations are possible	Compared with standard: LEFT tilt is LARGER RIGHT tilt is SMALLER
Standard pitch		460 mm (18.1 in) (both left and right)
Rear pitch	Both left and right tilt operations are possible	Compared with standard: LEFT tilt is SMALLER RIGHT tilt is LARGER
Max. rear pitch		Only right tilt operation is possible

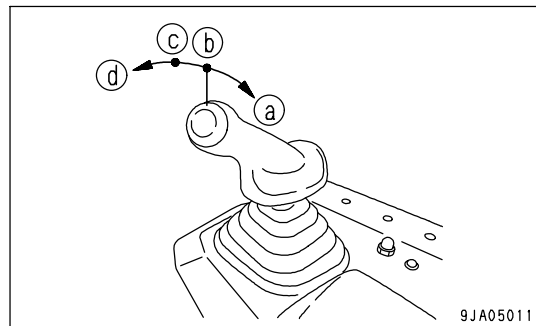


### ANGLE DOZER (D65EX,D65PX)

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

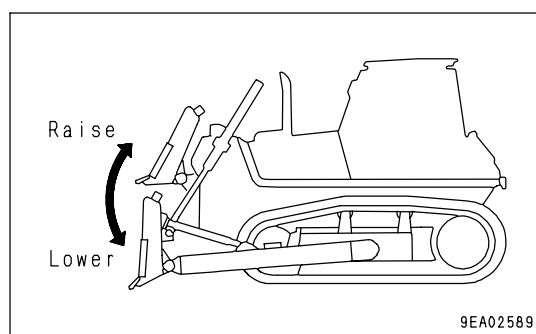
- Lifting control

- (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

- If the lever is in the FLOAT position, even when it is released, it does not return to the HOLD position, so return it by hand.
- If the engine is stopped when the control lever is in the FLOAT position, the lever is returned automatically to the HOLD position.
- In low temperatures, it may take a short time for the blade control lever to be held in the FLOAT position, so hold the lever in position for at least 1 second.



## CIRCUIT BREAKER

### NOTICE

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

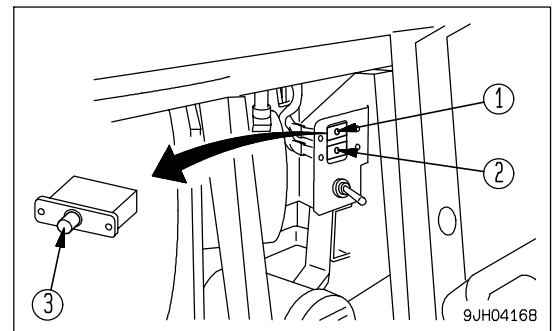
If the starting switch does not work when it is turned to the ON position, the circuit has probably been cut off by the circuit breaker.

Inspect the circuit breaker.

### REMARK

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

1. Open the cover at the bottom of the front panel. Circuit breakers (1) and (2) can be seen.  
(Circuit breaker (2) is installed only on machines equipped with an air conditioner.)
2. When the circuit breaker has cut off the circuit, reset button (3) springs out.  
Push reset button (3) in.



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

# FUSE

## NOTICE

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

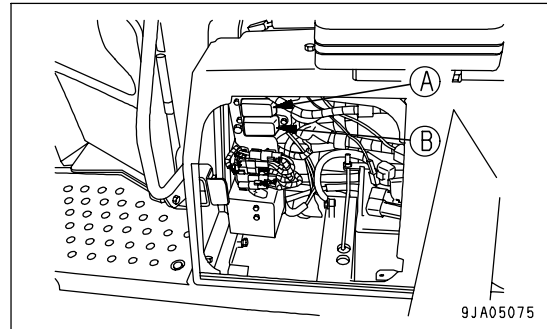
The fuses protect the electrical equipment and wiring from burning out.

If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace the fuse with another of the same capacity.

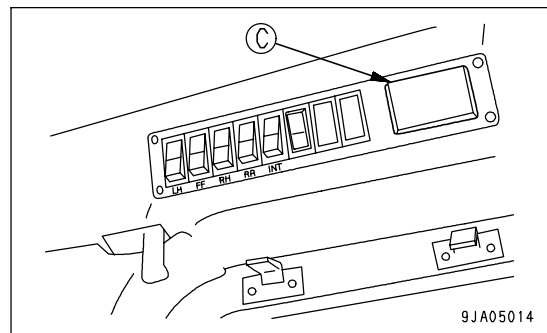
- Chassis

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



- Cab (machines equipped with cab)

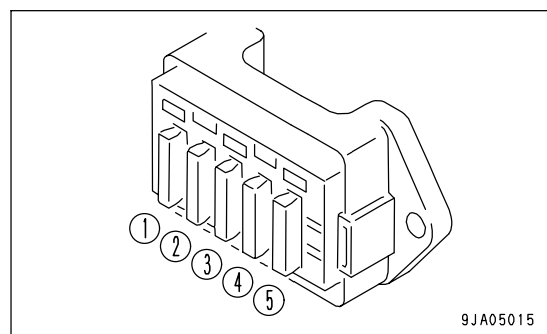
Fuse box (C) is installed in the overhead panel.



## FUSE CAPACITY AND CIRCUIT NAME

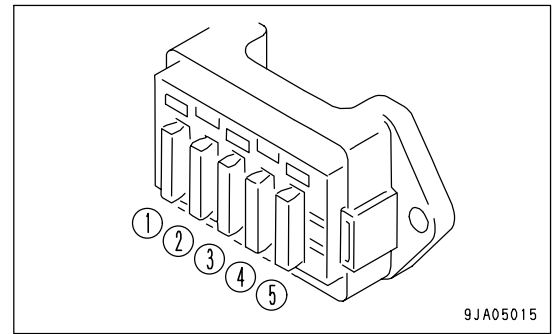
Fuse box (A)

NO.	Fuse capacity	Circuit
(1)	20A	Spare power source
(2)	15A	Horn, Engine preheater heater PTP valve
(3)	20A	Front lamp, Rear lamp
(4)	20A	Transmission, Steering controller
(5)	10A	Continuous power source



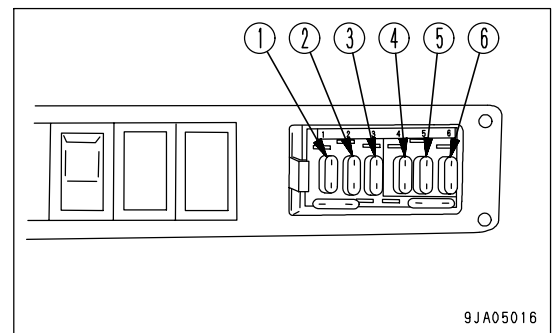
Fuse box (B)

NO.	Fuse capacity	Circuit
(1)	15A	Monitor panel
(2)	20A	Fuel pump
(3)	30A	Air conditioner (if equipped)
(4)	10A	Backup alarm (if equipped)
(5)	30A	Body power source



Fuse box (C)

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



FUSIBLE LINK

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

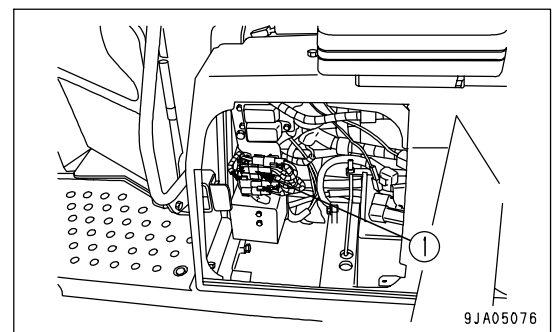
REMARK

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

- Fusible link (1)

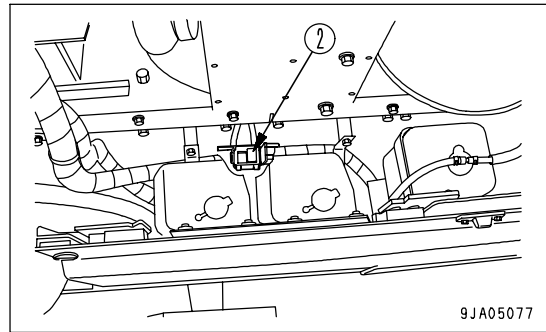
Open the battery cover on the left side of the machine. Fusible link (1) can be seen.

Capacity: 65 A



- Fusible link (2)

Open the engine side cover on the right side of the machine.  
Fusible link (2) can be seen under the window washer tank.  
Capacity: 120 A



9JA05077

## ELECTRIC POWER TAKE-OUT ADAPTER

### MACHINE EQUIPPED WITH CAB

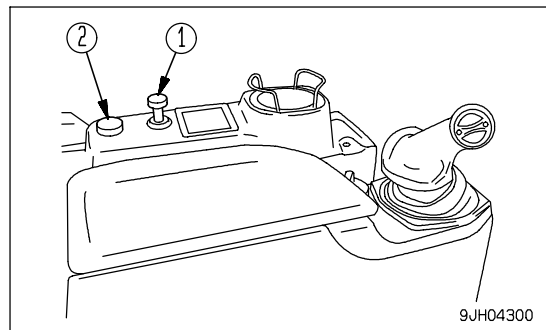
#### NOTICE

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

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

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

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



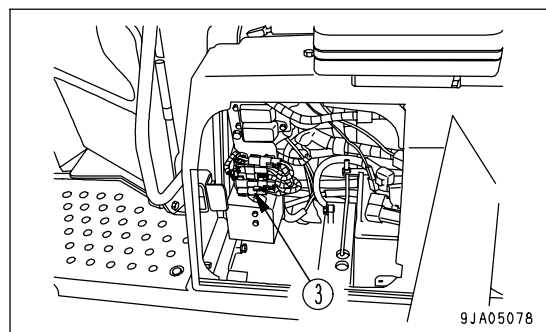
9JH04300

### MACHINE EQUIPPED WITH CANOPY

#### NOTICE

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

1. Open the battery cover on the left side of the machine body.
2. There is the connector for the spare power take-off.  
(Connector CN800 (3) can be used.)



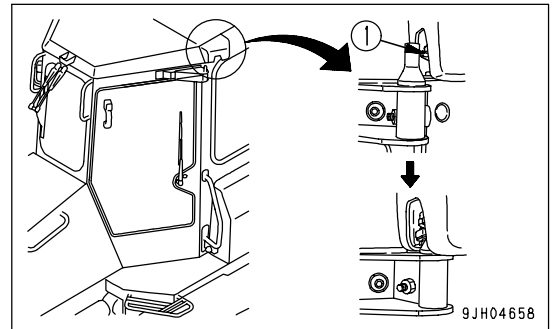
9JA05078

### DOOR - OPEN LOCK

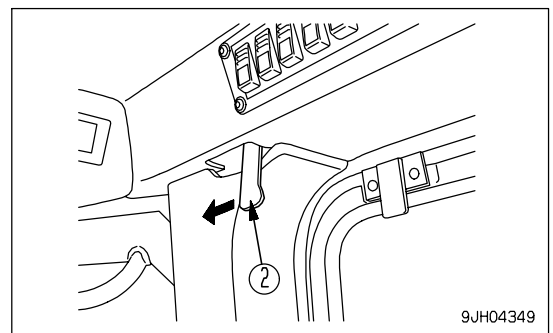
(Machines equipped with cab)

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

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



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



#### NOTICE

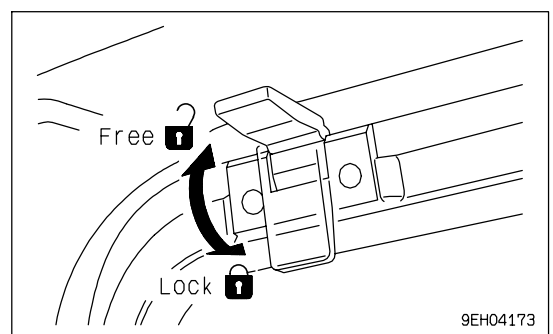
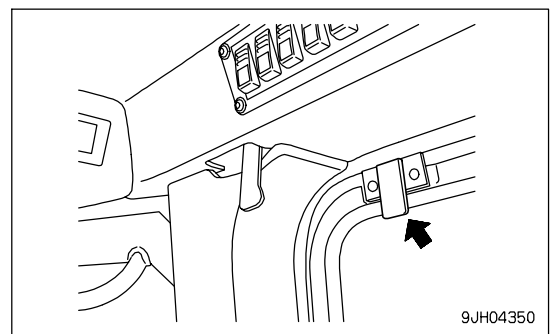
- When keeping the door open, fix it securely to the catch.
- Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.
- Keep the door locked open securely. The door may swing closed because of the vibration.

### SASH GLASS INTERMEDIATE LOCK

(Machines equipped with cab)

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

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





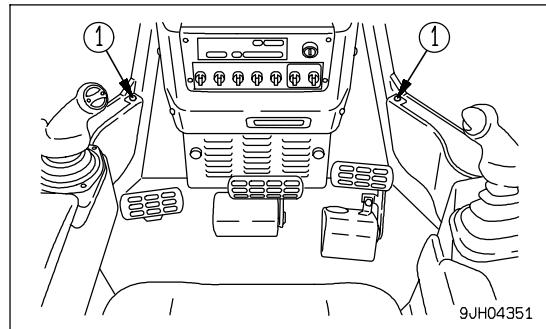
## DOOR POCKET

(Machines equipped with cab)

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

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

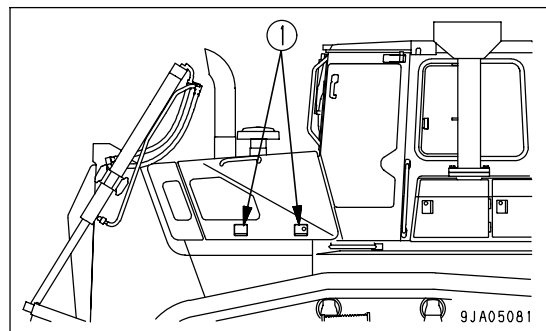
If the pocket is dirty, turn 4 clips (1), then remove the pocket and rinse it.



## OPENING AND CLOSING ENGINE SIDE COVER

### When opening

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



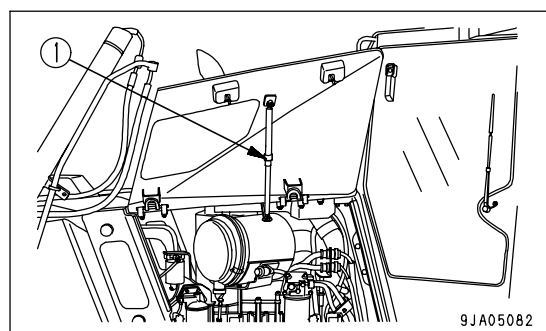
### When closing

#### NOTICE

When closing the cover, always release the gas damper lock first.

**If the gas damper lock is not released and any attempt is made to close the cover, the gas damper may break.**

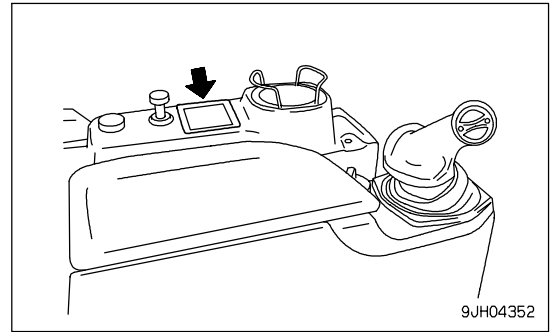
Push the orange button in the center of the gas damper (1) to release the lock, then push the cover down.



## ASHTRAY

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

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



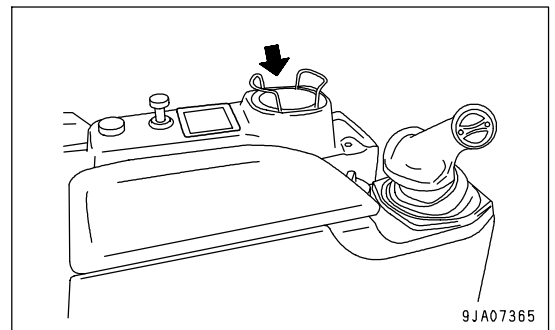
## CUP HOLDER

(If equipped)

This is the place to put cans or cups.

If drinks are put in places other than the cup holder, the can or cup will fall over and make the surrounding area or equipment dirty.

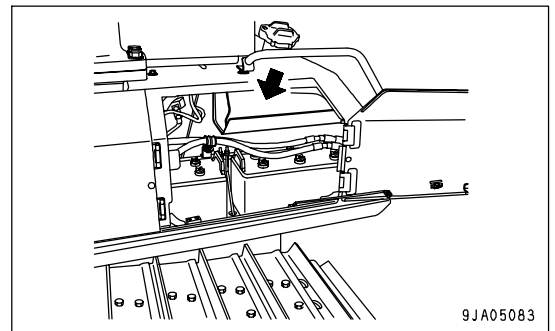
Please make full use of the cup holder.



## TOOL BOX

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

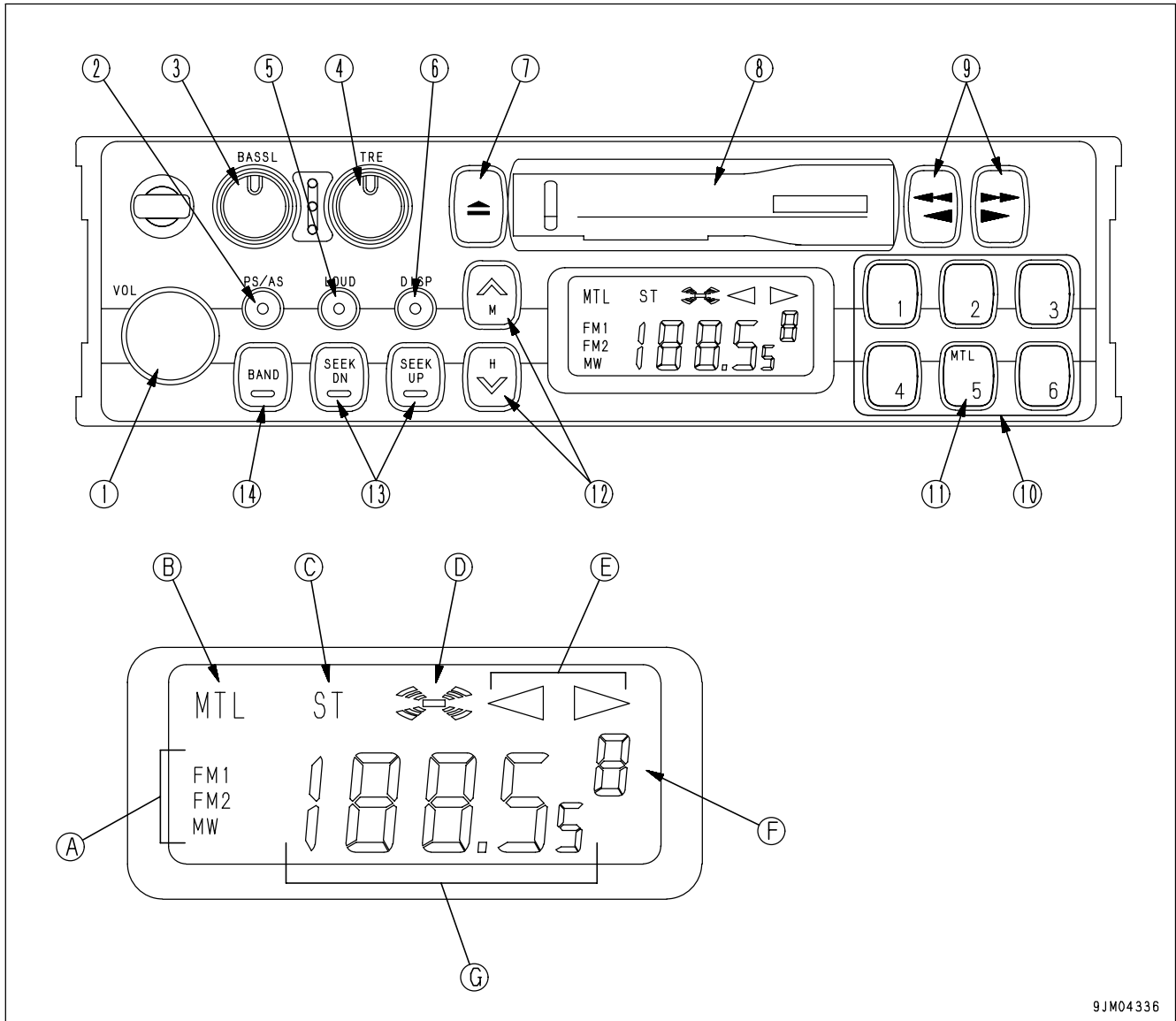
Keep the tools in this box.



**CAR STEREO, HANDLING**

(Machine equipped with cab) (If equipped)

**EXPLANATION OF COMPONENTS**

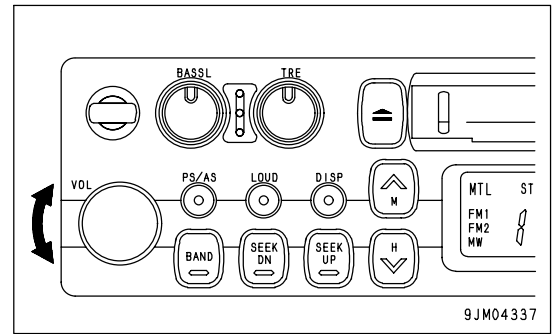


9JM04336

- |  |                                  |
|--|----------------------------------|
| (1) Power switch/volume                | (8) Cassette door                |
| (2) Auto-store/preset scan button      | (9) Fast forward, rewind buttons |
| (3) Bass control knob                  | (10) Preset buttons              |
| (4) Treble control knob                | (11) Metal tape button           |
| (5) Loudness button                    | (12) Manual tuning buttons       |
| (6) Time/radio display selector button | (13) Seek tuning buttons         |
| (7) Tape eject button                  | (14) Band selector button        |
| (A) Band display                       | (E) Tape direction display       |
| (B) Metal tape display                 | (F) Preset channel display       |
| (C) FM stereo reception display        | (G) Time/frequency display       |
| (D) Loudness display                   |                                  |

**POWER SWITCH/VOLUME**

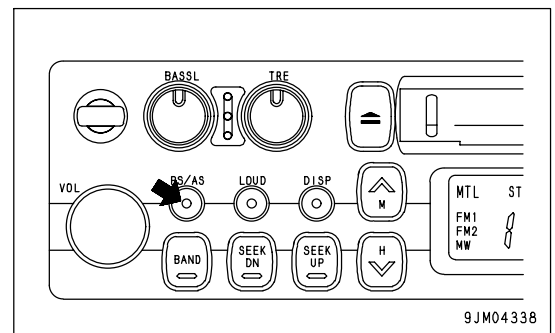
Turn this knob (1) to the right until it clicks to turn the power on.  
Turn it further to increase the volume.



**AUTO-STORE/PRESET SCAN BUTTON**

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

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



**REMARK**

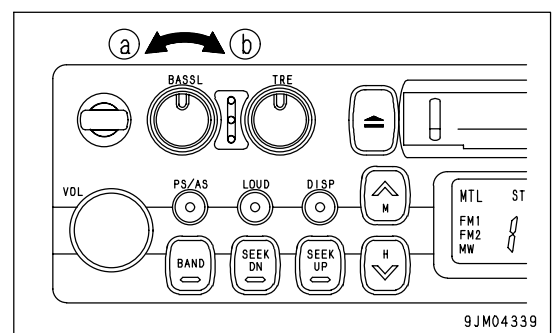
The auto-store function cannot be used when the channel display is flashing.  
When the display is flashing, the preset scan function is being used.

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

**BASS CONTROL KNOB**

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

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

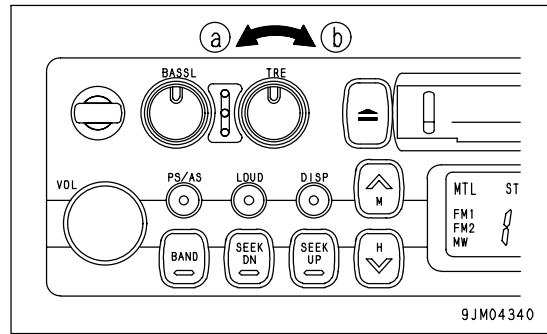


**TREBLE CONTROL KNOB**

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

Direction (a): High tone reduced

Direction (b): High tone emphasized

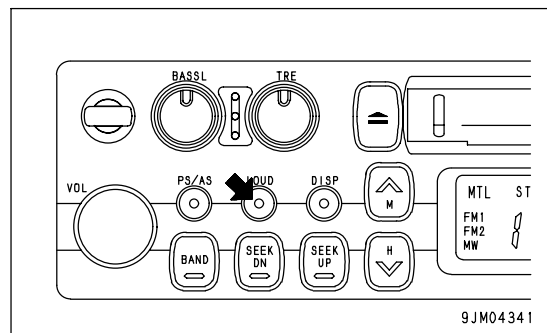


**LOUDNESS BUTTON**

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

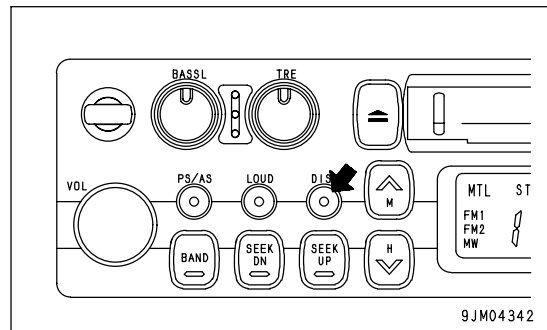
Push button: Actuated (ON)

Push button again: Canceled (OFF)



**TIME/RADIO DISPLAY SELECTOR BUTTON**

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



- Correcting the time

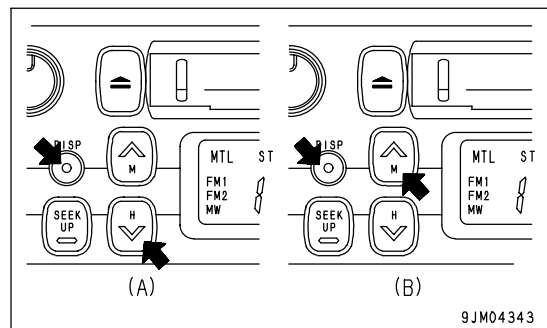
Press the button to set the time display.

(A) Correcting hour:

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

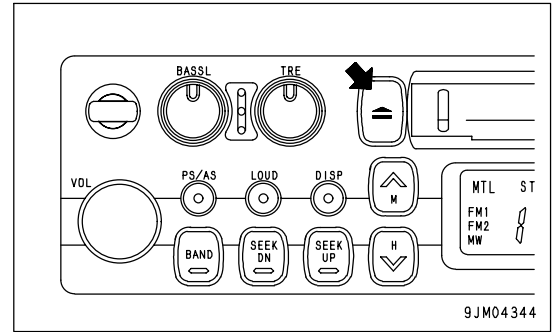
(B) Correcting minute:

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



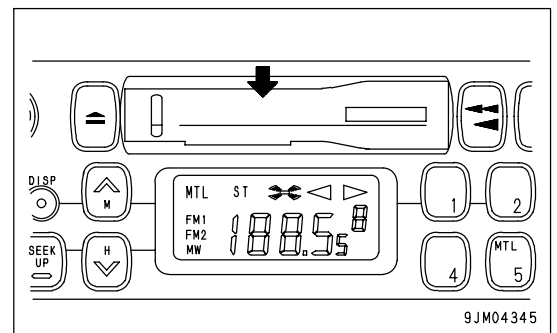
**TAPE EJECT BUTTON**

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



**CASSETTE DOOR**

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



**FAST FORWARD, REWIND BUTTONS**

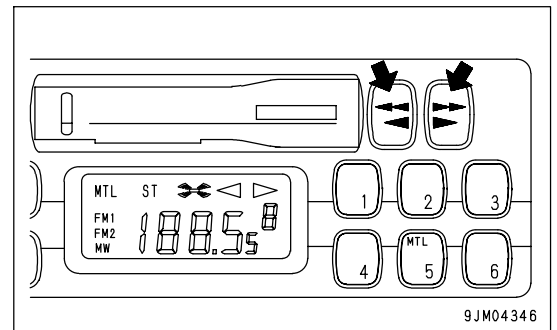
These buttons (9) are used to fast-forward or rewind the tape.

- Fast-forward/rewind

If you press the button pointing in the same direction as the lighted arrow indicating the direction of play, the tape will be fast-forwarded; if you press the button pointing in the opposite direction, the tape will rewind.

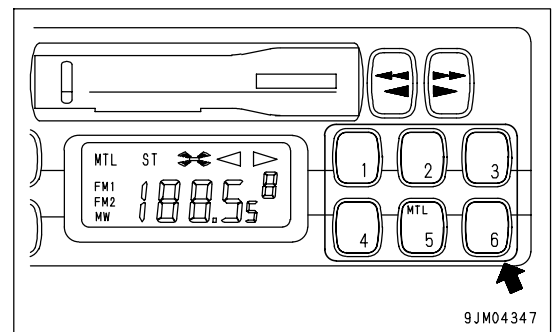
To stop the tape, lightly press the button that is not locked. The fast-forward or rewind operation will be canceled.

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



**PRESET BUTTONS**

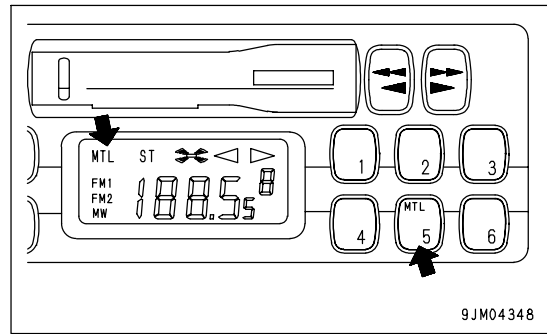
These buttons (10) are used to call up the broadcast station frequencies preset in memory for each of buttons No. 1 to No. 6. It is possible to preset 18 stations (FM: 12; AM: 6) with these buttons.



**METAL TAPE BUTTON**

(used also for preset button No. 5)

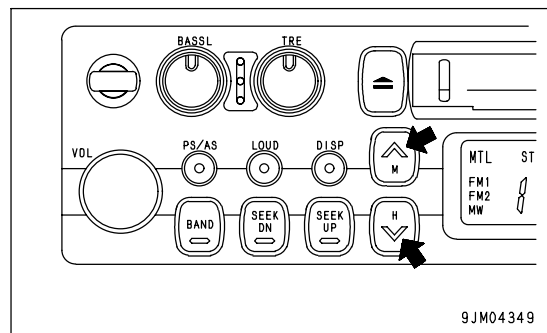
This button (11) is used when playing a metal or chrome tape. This button is also used for preset button No. 5. When it is pressed, "MTL" appears on the display.



**MANUAL TUNING BUTTONS**

These buttons (12) are used for manual tuning.

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

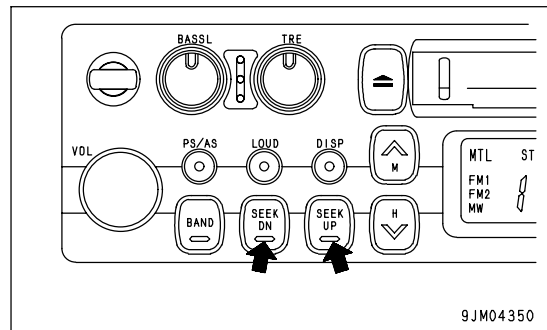


**SEEK TUNING BUTTONS**

These buttons (13) are used to seek tuning.

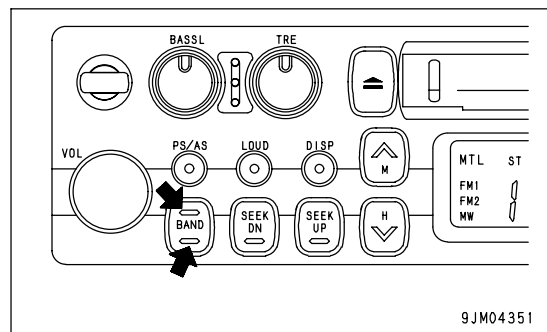
When the "SEEK UP" button is pressed, the search automatically goes up; when the "SEEK DOWN" button is pressed, the search automatically goes down.

When the next station that can be received is found, it automatically stops.



**BAND SELECTOR BUTTON**

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



**METHOD OF OPERATION**

**METHOD OF SETTING PRESET BUTTONS**

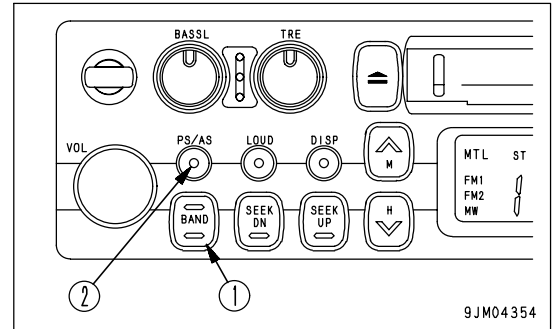
It is possible to preset 6 MW (AM) stations and 12 FM stations (FM1: 6 stations, FM2: 6 stations).

**REMARK**

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

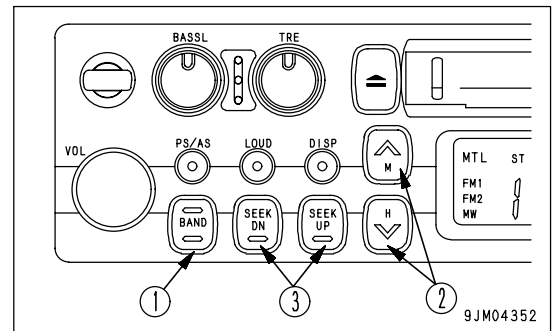
**METHOD OF AUTO PRESET**

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



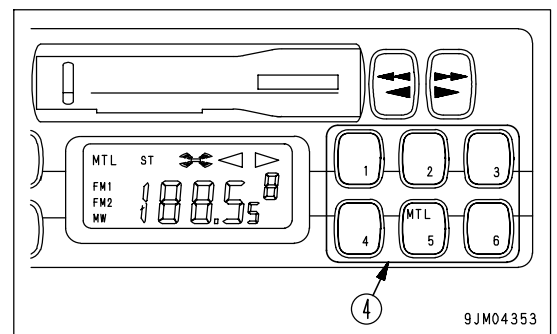
**METHOD OF MANUAL PRESET**

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



**REMARK**

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





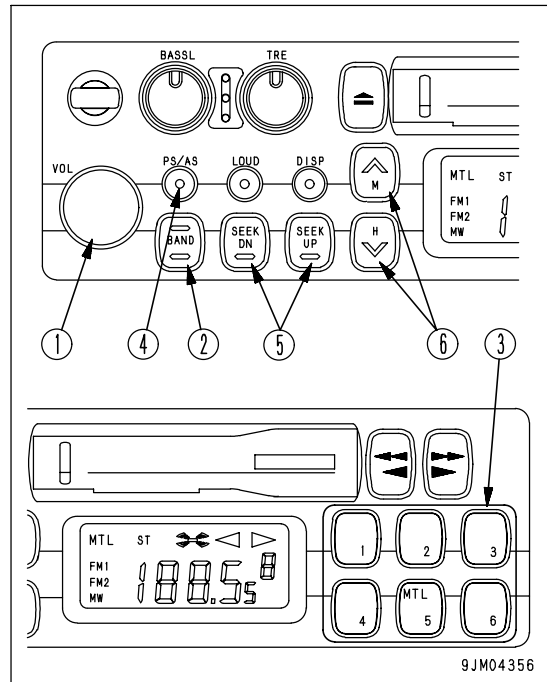
**LISTENING TO RADIO**

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

**REMARK**

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

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



**REMARK**

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

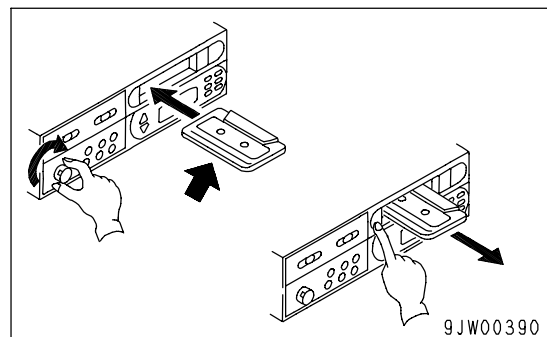
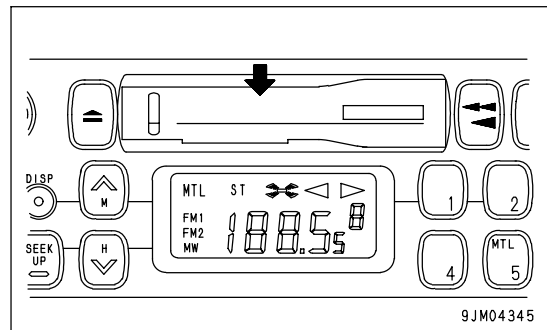
**LISTENING TO A CASSETTE TAPE**

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Set the cassette with the exposed portion of the tape on the right side and push it past the cassette door. The tape will automatically start playing.

If the arrow indicating the direction of play is pointing to the right, the top side is being played; if the arrow is pointing to the left, the bottom side is being played.

When the tape reaches the end, it is automatically reversed and the other side starts to play.

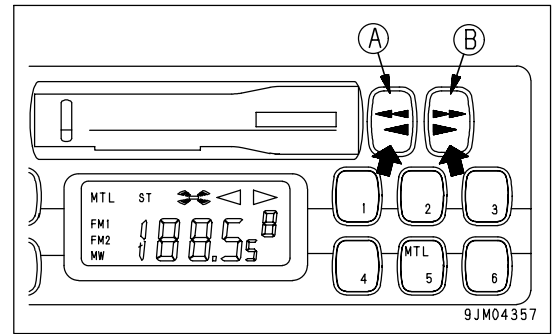
3. When finishing with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.



**REVERSING TAPE**

When listening to the tape, press both FAST FORWARD, REWIND buttons (A) and (B) at the same time lightly.

When this is done, the tape direction display will be reversed.

**PRECAUTION WHEN USING****WARNING**

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

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

**NOTICE****Handling cassette tape**

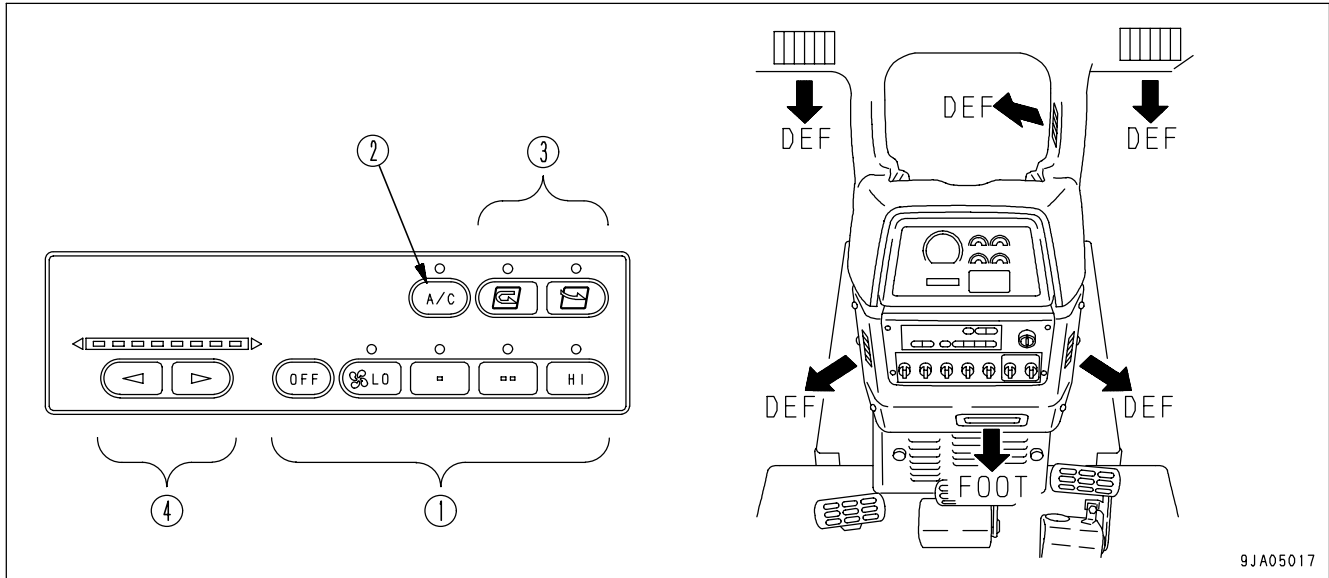
- Clean the tape head approx. once a month with a commercially available head cleaning tape.
- Do not leave the tape any place where it is exposed to direct sunlight, any place that is excessively dusty, or any place where there is a magnetic field.
- Do not use 120-minute tapes. The tape is thin and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

### AIR CONDITIONER, HANDLING

(Machine equipped with cab) (If equipped)

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

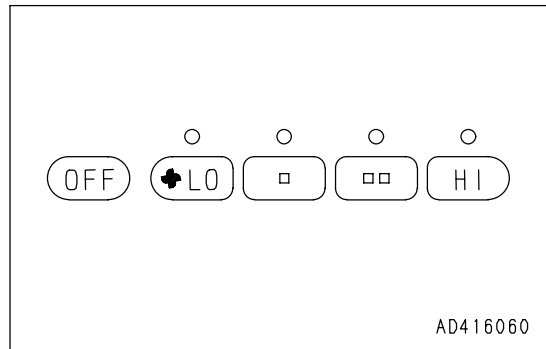
### GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL



- (1) Fan switch
- (2) Air conditioner switch
- (3) Fresh/recirc selector switch
- (4) Temperature control switch

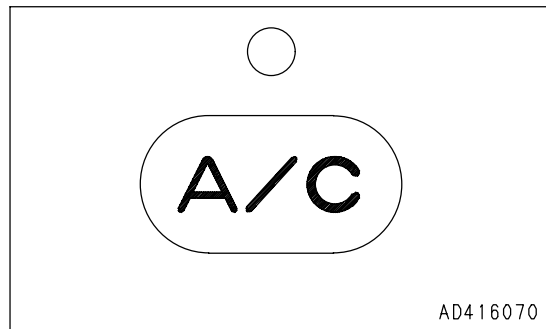
### FAN SWITCH

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



### AIR CONDITIONER SWITCH

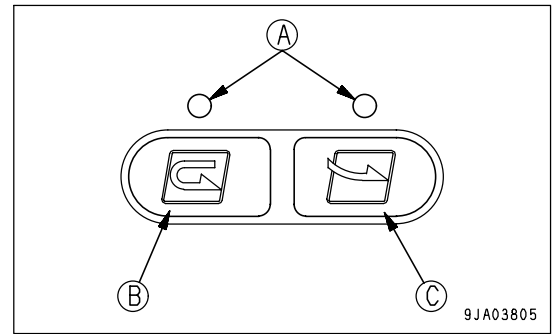
This switch (2) is used to start or stop the cooling or dehumidifying function. When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up. When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.



**FRESH/RECIRC SELECTOR SWITCH**

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

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

**Recirculation of air inside cab**

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

**Intake of fresh air from outside**

Press this switch (C) to carry out heating or cooling with fresh air taken in from the outside. Use this position when fresh air is taken in from outside the cab, or when removing the mist from the cab windows.

**REMARK**

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

**TEMPERATURE CONTROL SWITCH**

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

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

The more blue lamps on, the lower the temperature is.

The color of the indicator lamp (A) changes while the switch is being pressed.

When the temperature reaches the desired level, release the switch to set the temperature.

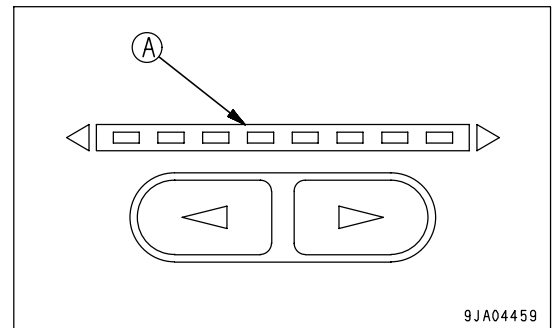
The settings for each mode are retained in memory even when the starting switch is turned OFF.

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

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

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

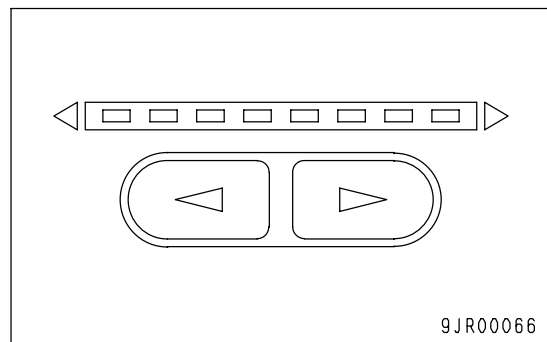
The higher the position of the fan switch, the more effective the pressurizing becomes.



**METHOD OF OPERATION**

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

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



**WHEN NOT USING THE AIR CONDITIONER REGULARLY**

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

**REMARK**

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

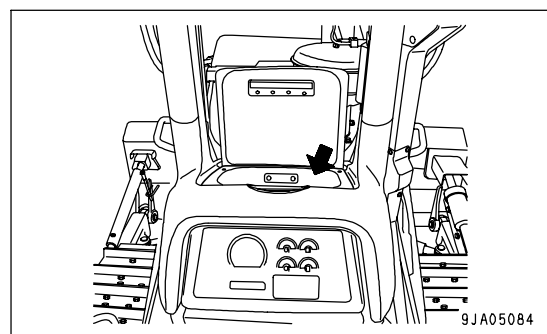
**COOL BOX**

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

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

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

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



## PRECAUTION WHEN USING AIR CONDITIONER

### PRECAUTION WHEN USING COOLING OPERATION

- If you smoke when using the air conditioner, your eyes may start to itch or burn. Ventilate the cab ever so often to remove the smoke.
- When using the air conditioner for a long period of time, carry out ventilation process at least once every hour. When using the air conditioner, it is recommended for health reasons, that it should only feel slightly cooler (5 or 6 °C (9 or 10.8°F) lower than the outside temperature) when you enter the cab. Therefore, adjust the temperature to a suitable level.

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

- If the vents (left and right) in the middle of the dashboard are turned so that cold air plays directly on the cab door glass, moisture may condense on the outside of the cab door glass and reduce the visibility. (This occurs particularly in high temperatures.)  
If this happens, close the louvers of the vent and change the direction to prevent the cold air from playing directly on the surface of the glass

### INSPECTION DURING OFF-SEASON

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

### REMARK

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

### PROCEDURE FOR REPLACING RECEIVER

Replace the receiver once every two years.

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

### REMARK

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

### PRECAUTIONS WHEN REPLACING RECEIVER

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

### CHECK COMPRESSOR BELT TENSION AND REFRIGERANT (GAS) LEVEL

If the compressor belt is loose, or the refrigerant level is low, cooling is not carried out efficiently. For details, see "WHEN REQUIRED (PAGE 4-20)".

**CLEANING AIR FILTER**

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

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

For details of the cleaning method, see "WHEN REQUIRED (PAGE 4-20)".

## ACCUMULATOR, HANDLING

(If equipped)



### WARNING

The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion, which will lead to serious injury or damage. When handling the accumulator, always do as follows.

- The pressure in the control circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation.

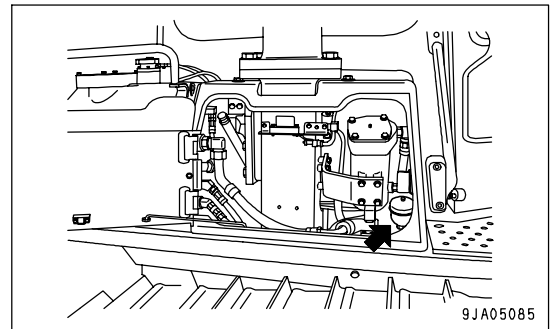
Loosen the bolts slowly.

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

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

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

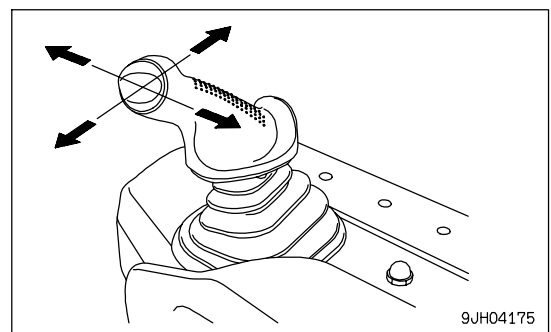
The accumulator is installed in the position shown in the diagram on the right.



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

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

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





## OPERATION

### CHECK BEFORE STARTING ENGINE, ADJUST

#### WALK-AROUND CHECK

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



#### WARNING

- Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.  
Check carefully, and if any 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, reposition it level before checking.

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

1. Check for damage, wear, play in work equipment, cylinders, linkage, and hoses.  
Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any problem is found, repair it.
2. Remove dirt and debris from around the engine, battery, and radiator.  
Check for dirt accumulated around the engine and radiator. Also check for flammable material (dry leaves, twigs, etc.) around the battery, engine muffler, turbocharger, or other high temperature engine parts. If any dirt or flammable materials are found, remove them.
3. Check for coolant and oil leakage around the engine  
Check for oil leakage from the engine and coolant leaks from the cooling system. If any problem is found, repair it.
4. Check for oil leakage of oil from power train case, final drive case, hydraulic tank, hoses, and joints  
Check that there is no oil leakage. If any problem is found, repair the place where the oil is leaking.  
Check for leakage of oil from the undercover. Check the ground for traces of oil leakage.
5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.  
If any problem is found, repair it.
6. Check for problems in handrails, steps, loose bolts.  
If any problem is found, repair it. Tighten any loose bolts.
7. Check for problems in gauges and monitor  
Check that there is no problem in the gauges and monitor in the operator's cab. If any problem is found, replace the parts. Clean off any dirt on the surface.

8. Check for damage to seat belt and mounting clamps (if equipped)  
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 check the items in this section before starting the engine each day.

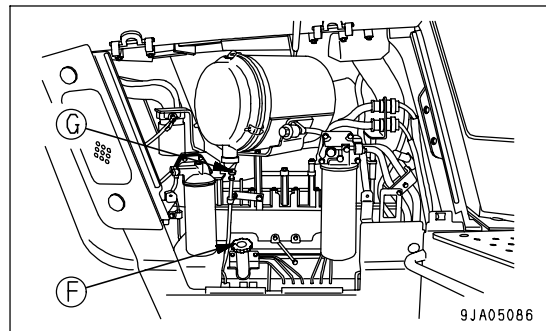
### CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL



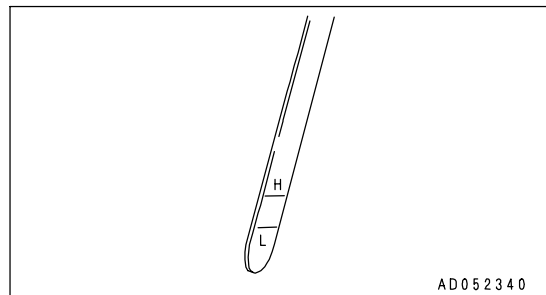
## WARNING

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

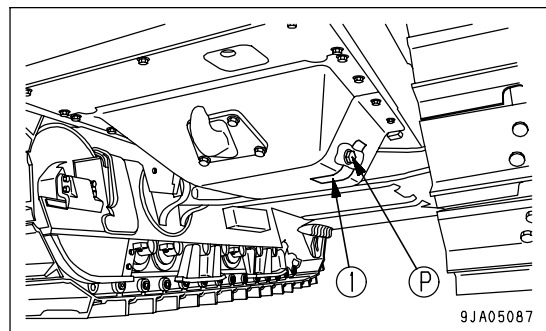
1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe (F), then remove it.



4. The oil level should be between the 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 level is above the H mark, remove cover (1) at the bottom of the machine.  
Loosen drain plug (P), drain the excess oil, then check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.



### REMARK

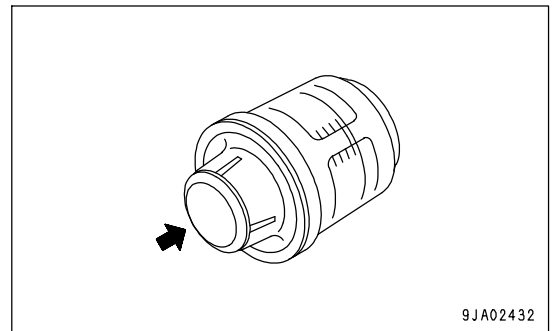
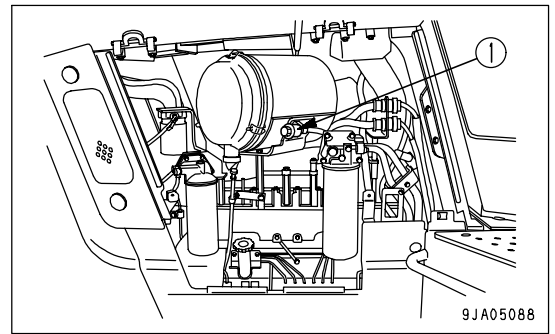
- If the machine is at an angle, reposition it to level before checking.
- When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.

**CHECK DUST INDICATOR**

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

For cleaning the filter element, refer to the section, "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-20)", in this manual.

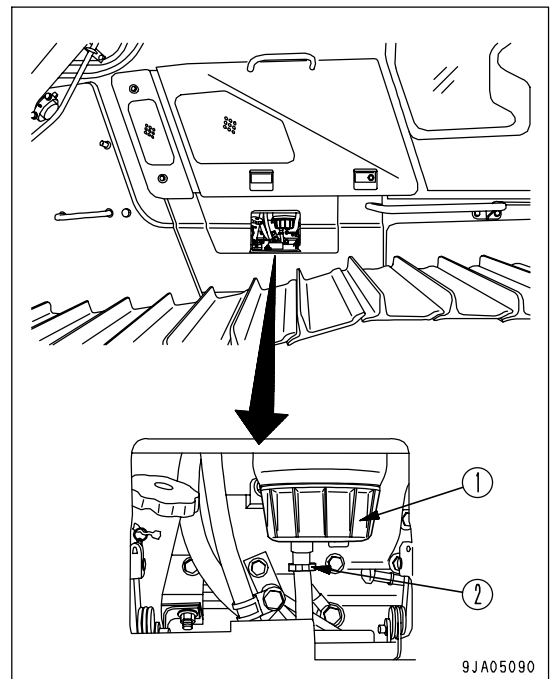
4. After checking, cleaning, and replacing, press the knob of dust indicator (1) to return the yellow piston to its original position.

**CHECK, DRAIN WATER SEPARATOR**

(If equipped)

The water separator separates the water from the fuel.

1. Open the inspection cover at the bottom of the left engine side cover.
2. If there is water collected inside water separator (1), loosen valve (2) and drain the water.



## CHECK COOLANT LEVEL, ADD COOLANT

**WARNING**

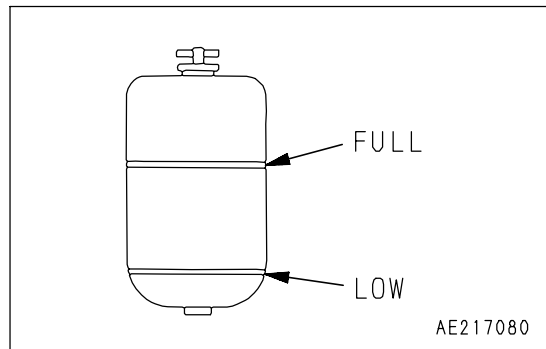
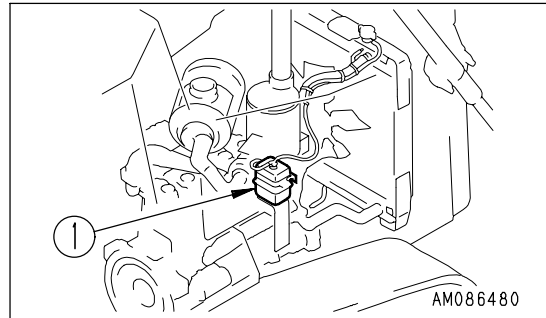
- Do not open the radiator cap unless necessary. Wait for the engine to cool down before checking the coolant in the sub-tank.
- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to check the coolant level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

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

**REMARK**

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

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

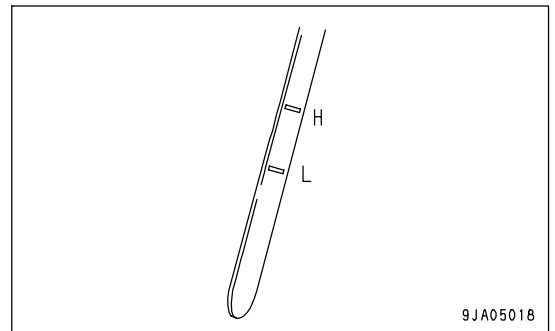
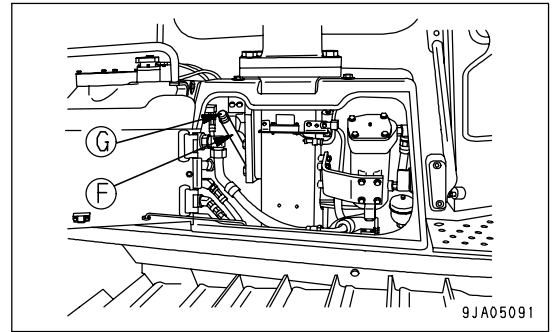


## CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL

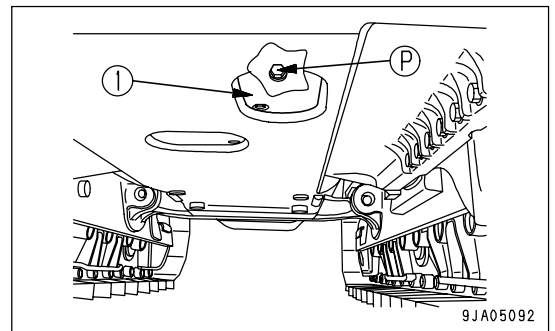
**! WARNING**

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

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



5. If the oil level is above the H mark, remove cover (1) on the bottom of the machine.  
Loosen drain plug (P), drain the excess oil, then check the oil level again.
6. If the oil level is correct, insert dipstick (G) fully into the dipstick guide again.

**REMARK**

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

## CHECK ELECTRIC WIRING

**! WARNING**

- If the fuses frequently blow or if there are traces of short circuits in the electrical wiring, locate the cause and immediately perform repairs, or contact your Komatsu distributor for repairs.
- Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clean the breather hole.

Check that there is no damage to the fuses; that fuses of the specified capacity are used; that there is no disconnection or trace of short-circuiting on the electric wiring and no damage to the covering. Check also that there is no loosened terminals. If any, tighten them.

Moreover, pay particular attention to the electric wiring when checking the battery, engine starting motor and alternator.

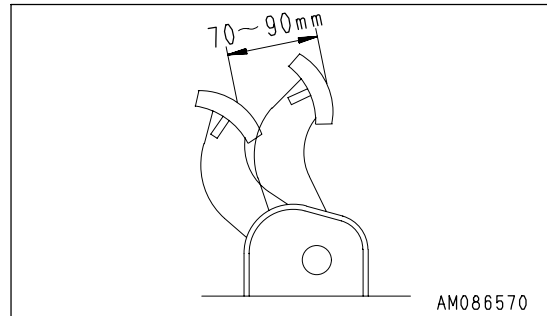
Be sure to check that there is no inflammable material accumulated around the battery. If present, remove it as soon as possible.

## CHECK BRAKE PEDAL TRAVEL

**WARNING**

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

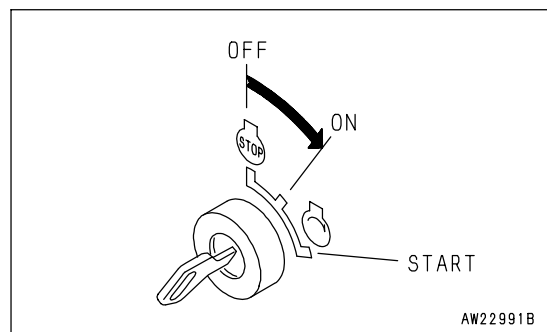
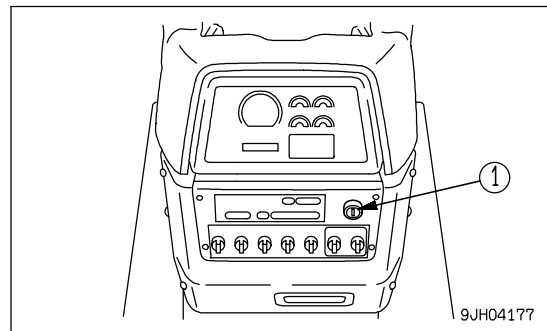
1. Depress the brake pedal all the way until it stops.
2. The distance of travel at the center of the pedal should be 70 to 90 mm (2.8 to 3.5 in).
3. When this value exceeds 91 mm (3.6 in), or the brake fails to work, please contact your Komatsu distributor for adjustment.

**CHECKING WITH MACHINE MONITOR**

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

**REMARK**

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



## CHECK FUEL LEVEL, ADD FUEL

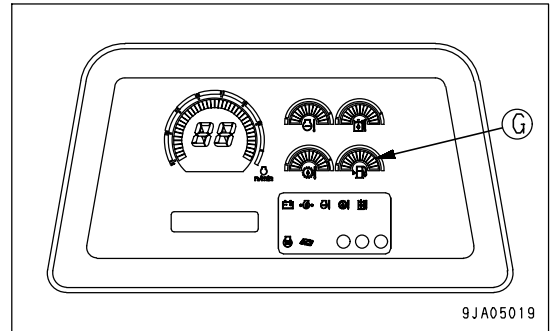
**WARNING**

When adding fuel, never spill the fuel or let it overflow. It will cause fire.

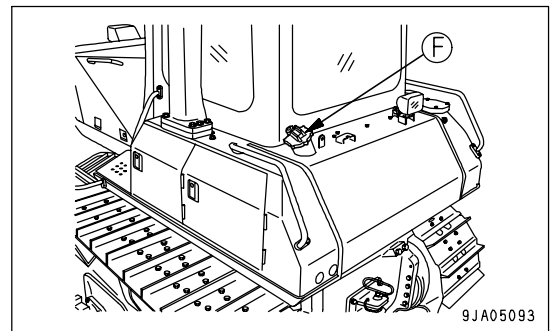
If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.

Fuel is highly flammable and dangerous. Never bring flames near fuel.

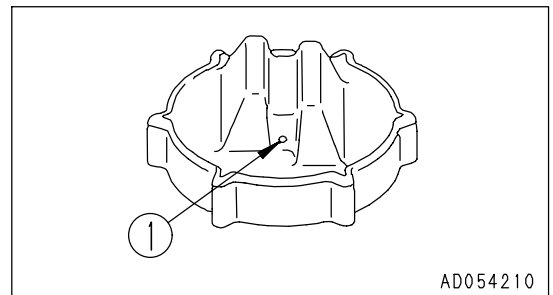
1. Turn the engine starting switch to the ON position and check the fuel level gauge (G) on the monitor panel for fuel level. After checking, turn the switch back to the OFF position.



2. After completing work, fill the fuel tank through fuel filler port (F).
- Fuel capacity: 415 liters (109.64 US gal)
3. After adding fuel, tighten the cap securely.

**REMARK**

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

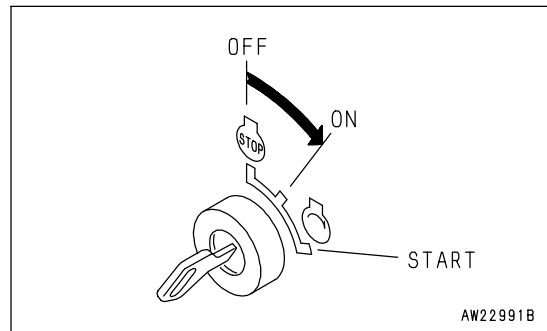




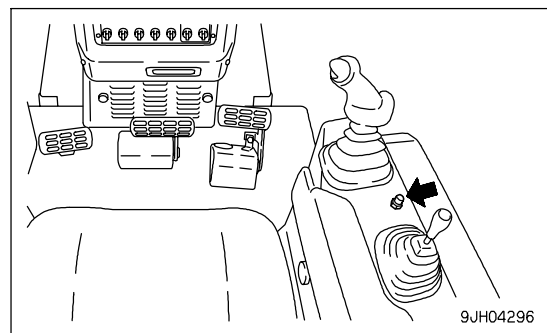
**CHECK HORN SOUND**

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

1. Turn the starting switch to the ON position.



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

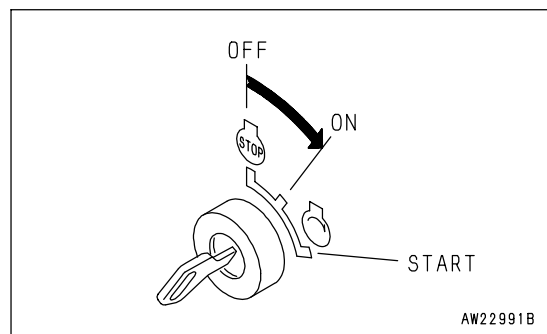


**CHECK THAT LAMPS LIGHT UP**

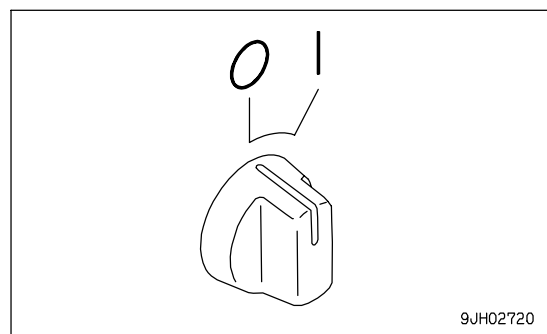
Check that the head lamp, rear lamp, additional working lamp (if equipped), and instrument lamp light up normally and they are free from stain and damage.

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

1. Turn the starting switch to the ON position.



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

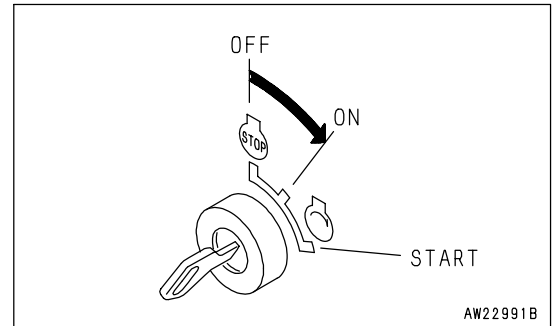


**CHECK OF OPERATION OF BACKUP ALARM**

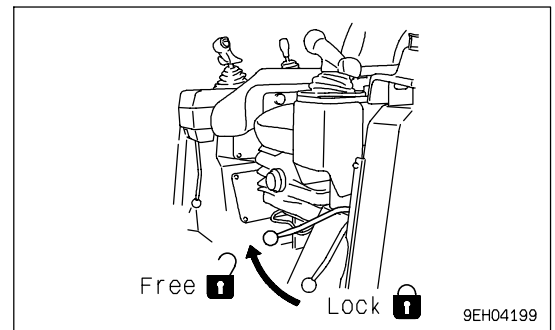
(If equipped)

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

1. Turn the starting switch to the ON position.

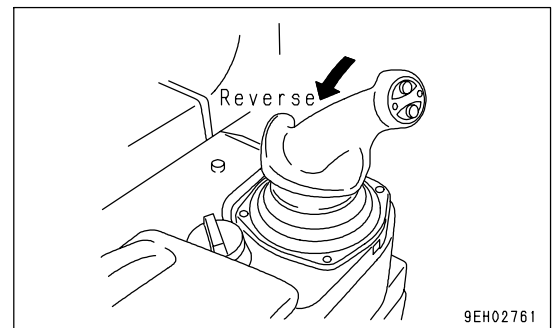


2. Set parking brake lever to the FREE position.



3. 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.



### ADJUSTMENT

#### ADJUST OPERATOR'S SEAT



### WARNING

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

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

#### (A) Fore-and-aft adjustment

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

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

#### (B) Weight adjustment of seat

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

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

#### REMARK

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

#### (C) Adjust reclining angle

#### 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) Seat angle adjustment

- Front angle adjustment of seat (5 stages)

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

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

- Rear angle adjustment of seat (5 stages)

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

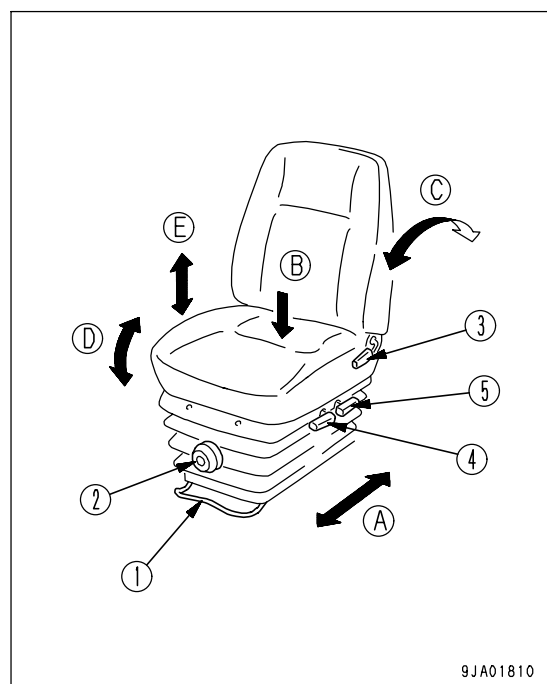
To lower the rear of the seat, apply your weight to the rear of the seat, while pulling up lever (5).

#### (E) Seat height adjustment

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

Then, release the levers to lock the seat.

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



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**FASTENING AND REMOVING SEAT BELT**

(If equipped)

**WARNING**

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

Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose. The tightening torque for the mounting bolt is  $24.5 \pm 4.9$  N·m ( $2.5 \pm 0.5$  kgf·m,  $18.1 \pm 3.6$  lbf·ft).

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

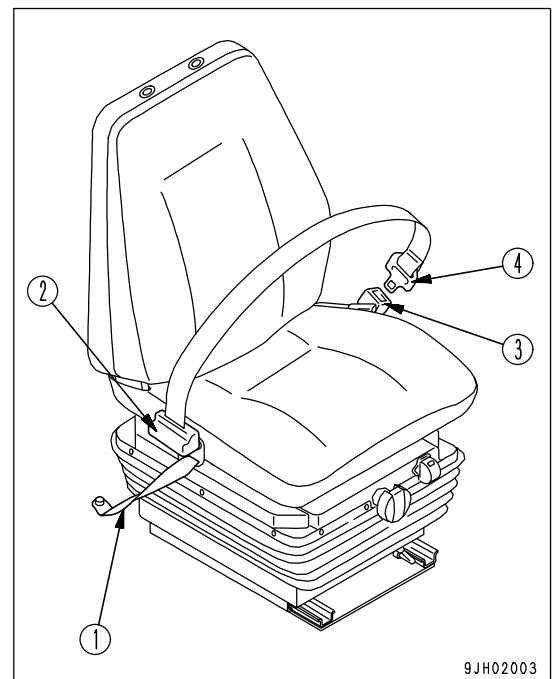
**FASTENING AND REMOVING SEAT BELT**

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

**REMARK**

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

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



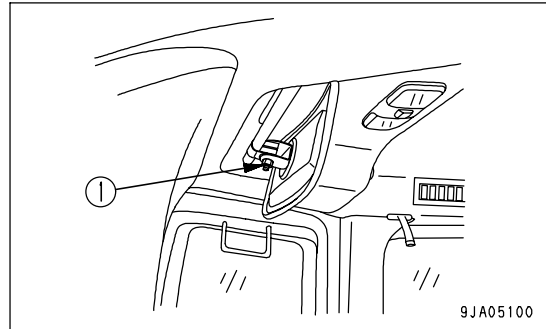
9JH02003

**ADJUST MIRROR**

(If equipped)

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

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



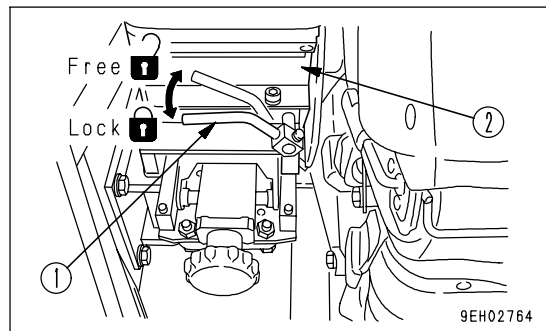
**ADJUST STEERING, FORWARD-REVERSE, GEAR SHIFT LEVER**



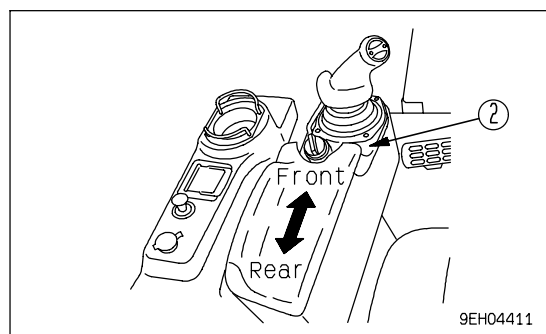
After moving case (2) in order to adjust the position of the steering, directional, and gearshift lever, secure lock lever (1) into the notched hole. Making sure it is in the LOCK position. If it is not completely locked, the steering, directional, and gearshift lever may unexpectedly move and cause damage, serious injury, or death.

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

1. Pull up lock lever (1) to the FREE position at the rear of case (2) on left side of the operator's compartment.



2. With lock lever (1) pulled up, use your other hand to grip the front of case (2), then move it forward with your left and right hands. The joystick moves with case (2).
3. Move case (2) to the desired position until a click is heard. Then pull up lock lever (1) and release it. Lock lever (1) automatically returns to the LOCK position.



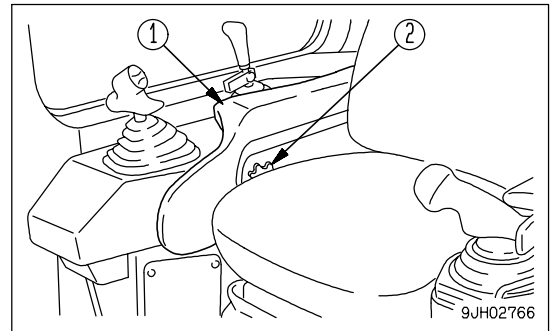
**ADJUST ARMREST**

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

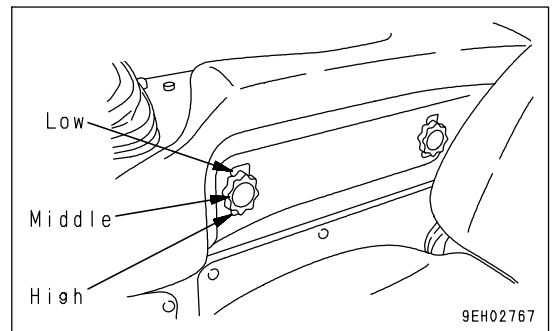
**ADJUST ARMREST (RIGHT)**

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

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



2. Move the armrest on the operator's seat to the front, then align the position of the 3 holes (high, middle, low).
3. Tighten knob (2) securely.



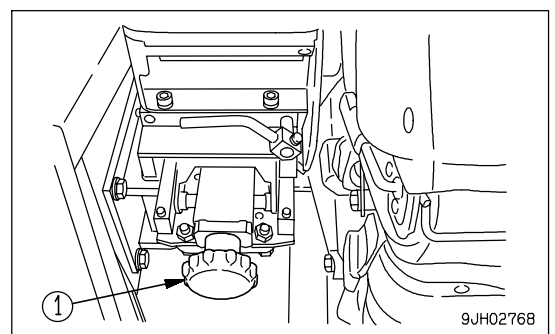
**ADJUST ARMREST (LEFT)**

The armrest on the left side of the operator's compartment can be adjusted to 2 heights. It is possible to adjust the standard height up 30 mm (1.2 in) or down 30 mm (1.2 in) gradually. The joystick moves as a unit.

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

Turn CLOCKWISE to move DOWN

Turn COUNTERCLOCKWISE to move UP

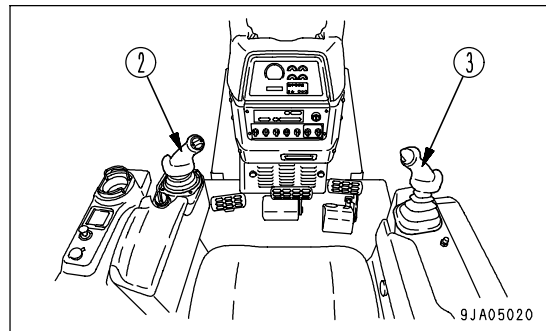
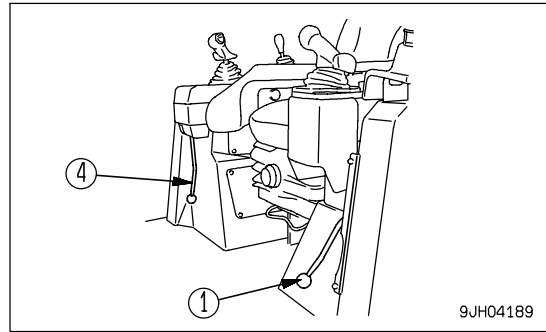


OPERATION AND CHECK BEFORE STARTING ENGINE

**! WARNING**

When starting the engine, check that the parking brake lever and work equipment lock lever are placed securely at the LOCK position.

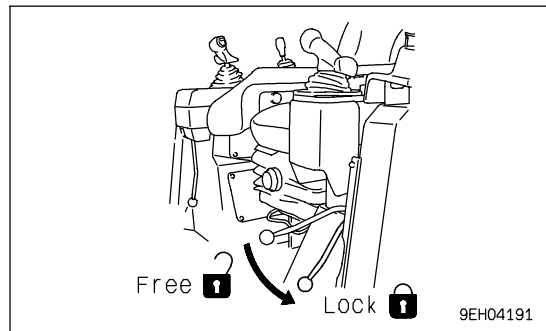
If the work equipment control lever is touched by accident when the engine is started, the work equipment may move unexpectedly and cause serious injury or damage.



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

**REMARK**

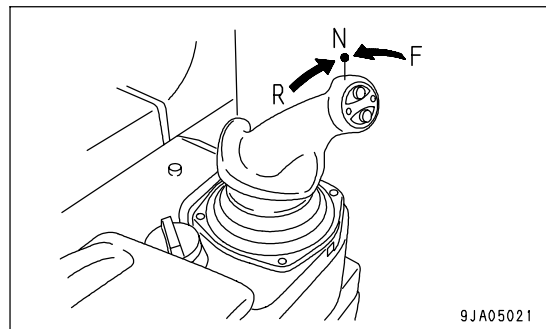
If this parking brake lever is not in the LOCK position, the engine will not start.



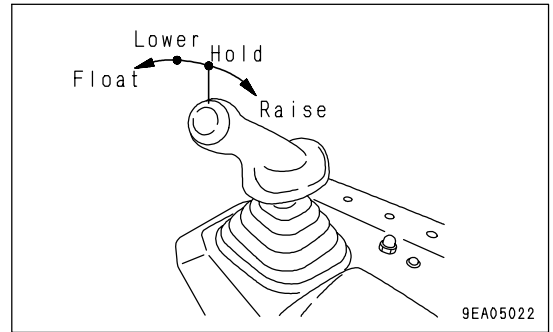
2. Check that steering, forward-reverse, gear shift lever (2) is in the N (neutral) position.

**REMARK**

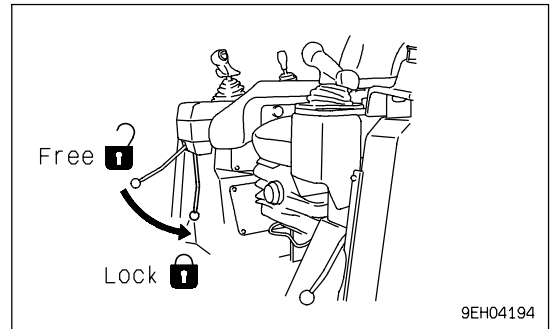
- The engine cannot be started if steering, forward-reverse, gear shift lever (2) is not in the N (neutral) position.
- If steering, forward-reverse, gear shift lever (2) is in FORWARD or REVERSE, the letter P on display panel A will flash.



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



4. Check that the work equipment lock lever (4) is locked.





## STARTING ENGINE

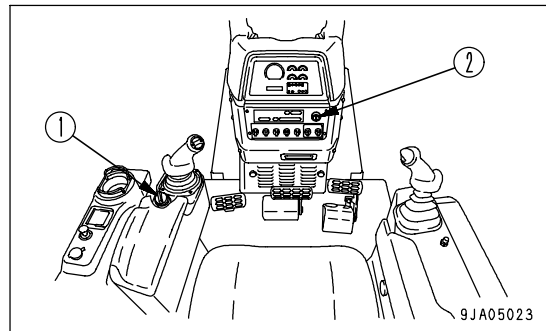
### NORMAL STARTING

#### **WARNING**

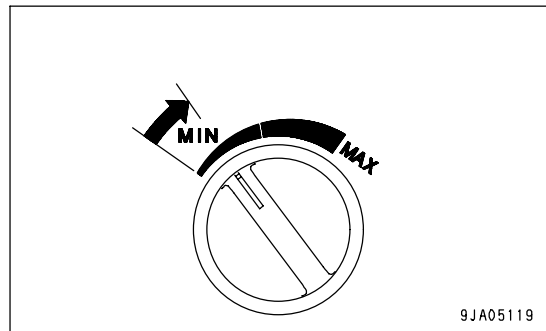
- Sit down in the operator's seat before starting the engine.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start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

#### NOTICE

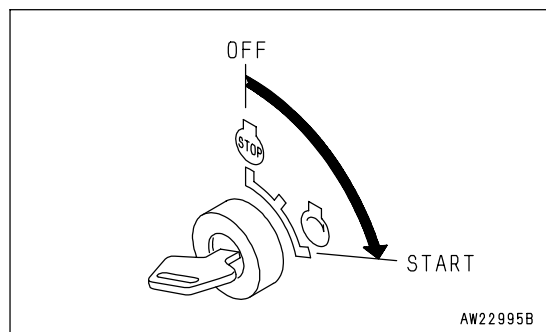
- Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.
- Before starting the engine, check that the fuel control dial is at the low idle (MIN) position.
- On this machine, to protect the turbocharger, a turbo protect function is provided. In cold weather, even if fuel control dial (1) is operated immediately after starting the engine, the engine speed may not change for several seconds.
- If the fuel control dial is in the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.



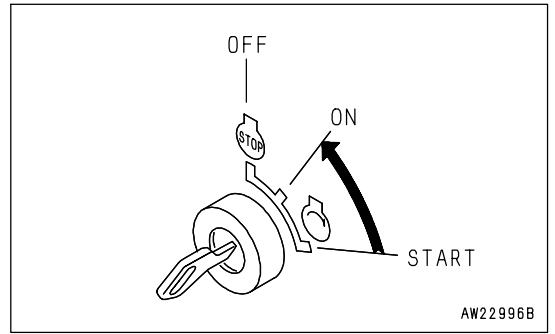
1. Turn fuel control dial (1) from the low idle (MIN) position to a slightly higher speed.



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



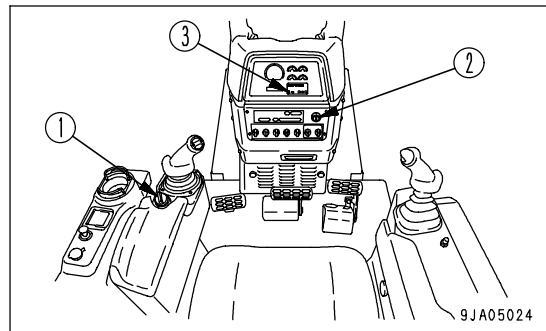
## STARTING IN COLD WEATHER

**WARNING**

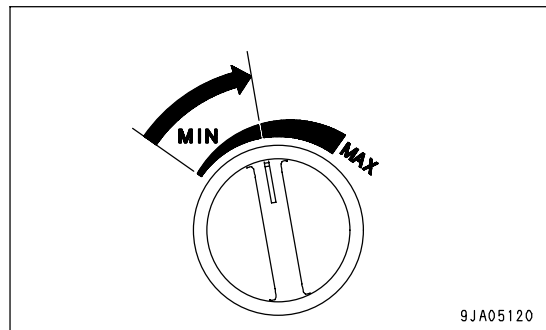
- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and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

## NOTICE

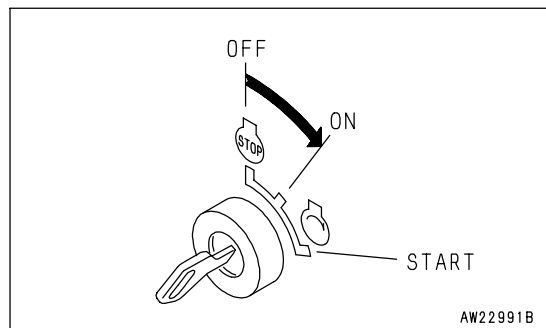
- Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.
- Before starting the engine, check that the fuel control dial is at the low idle (MIN) position.
- On this machine, to protect the turbocharger, a turbo protect function is provided. In cold weather, even if fuel control dial (1) is operated immediately after starting the engine, the engine speed may not change for several seconds.
- If the fuel control dial is in the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.



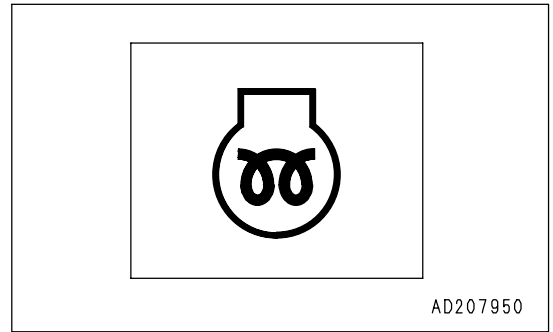
1. Turn fuel control dial (1) to the center position between MIN and MAX position.



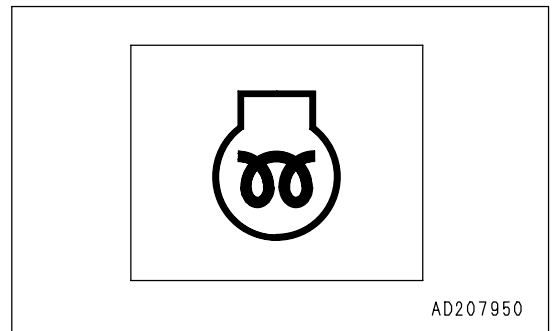
2. Insert the key into starting switch (2) and turn the key to the ON position.



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



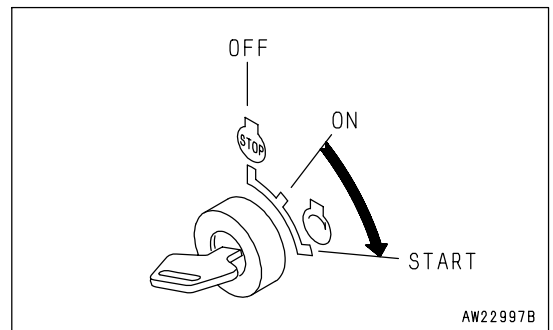
4. Maintain the key in the on position until the preheating pilot lamp (3) goes off.



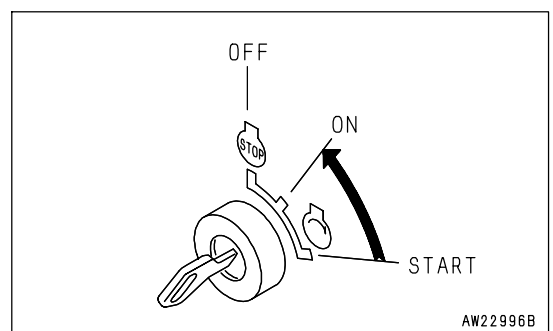
5. When engine pre-heating pilot lamp (3) goes off, turn the key of starting switch (2) to the START position to crank the engine.

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

Ambient temperature	Preheat time
-5°C to -10°C (23°F to 14°F)	20 to 27 seconds
-10°C to -20°C (14°F to -4°F)	27 to 40 seconds
-20°C to -30°C (-4°F to -22°F)	40 seconds



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



**REMARK**

Immediately after starting the engine, run at idle. While running the engine, release the decelerator pedal and do not operate the work equipment.

Guideline for idle time

- Cold weather: At least 15 seconds
- 1st start after changing engine oil or engine oil filter: 20 seconds

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

**REMARK**

- Regardless of the ambient temperature, if the key in starting switch (2) is turned from OFF position to left, preheating pilot lamp (3) will light up and preheating will start. (Preheating continues while the starting switch is held at the left.)

For the details of the preheating time, see the table in Step 5.

- While preheating is being carried out, the preheating pilot lamp (3) lights up to show that preheating is being carried out.
- If the engine does not start with the above operation, wait for about 2 minutes, and repeat steps 3. And 4.
- The relationship between the actuation time of the turbo protect function and the engine coolant temperature is as follows.

Even if the fuel control dial is operated within the time given below, the engine speed will not change.

**Turbo protect function**

The turbo protect function is a function to protect the turbocharger by keeping the engine speed at less than 1000 rpm immediately after the engine is started.

- When the turbo protect function is actuated, the engine speed is held at less than 1000 rpm, regardless of the position of the fuel control dial.
- When the turbo protect function is actuated, the engine speed is held at less than 1000 rpm, even if the fuel control dial is operated.
- When the turbo protect function is canceled, the engine speed is set to the speed for the position of the fuel control dial.
- The relationship between the length of time of actuating the turbo protect function and the temperature of the engine coolant is as shown in the next table.

Coolant temperature	Turbo protect time (sec.)
Above 10°C (50°F)	0
10 to -30°C (50 to -22°F)	Change 0 to 20
below -30°C (22°F)	20

## OPERATIONS AND CHECKS AFTER STARTING ENGINE



### WARNING

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

## BREAKING IN THE NEW MACHINE



### CAUTION

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break-in the machine for the initial 100 hours (as indicated by the service meter).

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

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

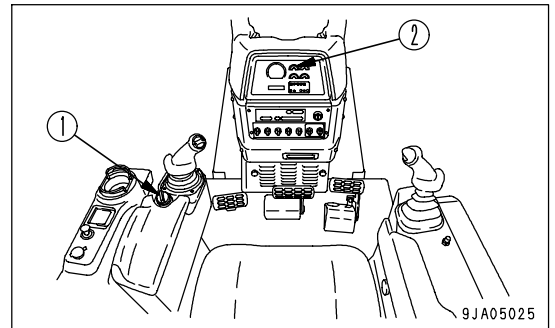
## WARMING UP OPERATIONS

### NOTICE

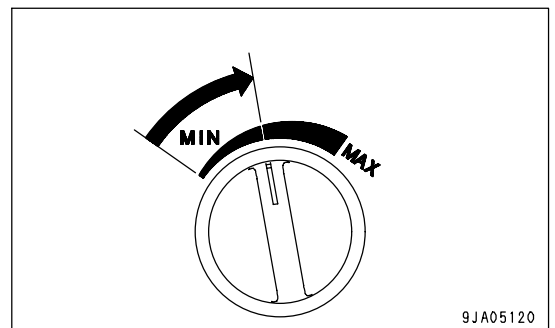
Avoid abrupt acceleration until warm-up run is completed.

Do not run the engine at low idle or high idle for more than 20 minutes.

If it is necessary to run the engine at idle, apply a load or run at a medium speed from time to time.



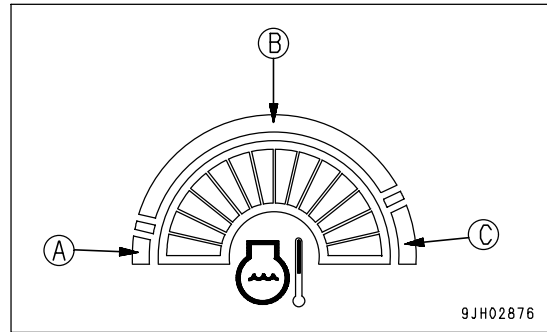
1. Turn fuel control dial (1) to the center position between LOW IDLE (MIN) and HIGH IDLE (MAX) and run the engine at medium speed for about 5 minutes with no load.



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

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

- (A): White range
- (B): Green range
- (C): Red range



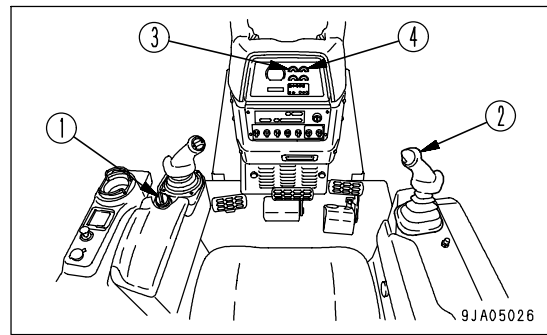
3. Check for abnormal exhaust gas color, noise, or vibration. If any abnormality is found, contact your Komatsu distributor.

### STARTING IN COLD WEATHER

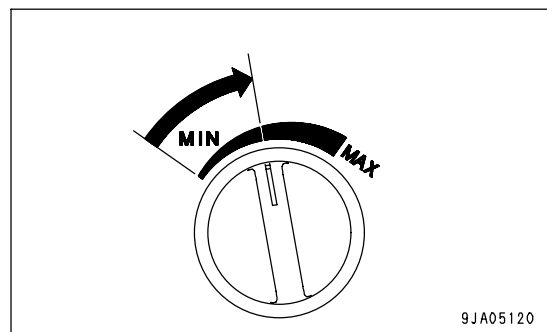
(Ambient temperature below 10°C (50°F))

#### NOTICE

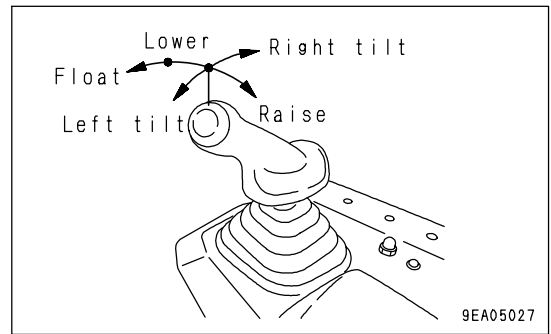
- When the hydraulic oil is at a low temperature, do not carry out operations or move the levers suddenly. Always carry out the warm-up operation. This will help to extend the machine life.
- Do not suddenly accelerate the engine before the warm-up operation is completed. Do not run the engine at low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



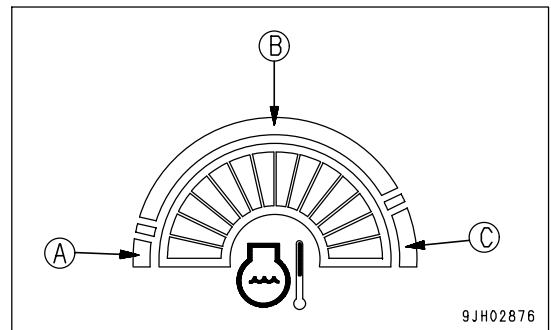
1. Turn fuel control dial (1) to the center position between LOW IDLE (MIN) and HIGH IDLE (MAX) and run the engine at medium speed for about 10 minutes with no load.



2. Blade control lever (2) to the full RAISE position, then hold the lever in position, and operate slowly to the left tilt relief and right tilt relief positions for 5 minutes.
  3. After this, operate the blade control lever (2) fully to the RAISE position, hold the lever in position, and relieve the left and right tilt intermittently. Next, move the lever to the LOWER position and lower the blade to the ground, then move the lever to the full FLOAT position, hold the lever in position, and relieve the left and right tilt intermittently for 5 minutes.
  4. Lower the blade to the ground, move the control lever fully to the FLOAT position (lever stroke end) and hold the lever in position for 1 minute. Next, release the lever and check that it stays in the FLOAT position. After waiting for 3 minutes, return the lever to the HOLD position.
  5. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
    - Continue to run the engine at light load until engine coolant temperature gauge indicator (3) and Hydraulic oil temperature gauge (4) fall within the green range (B).
- (A): White range  
 (B): Green range  
 (C): Red range



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**REMARK**

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

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

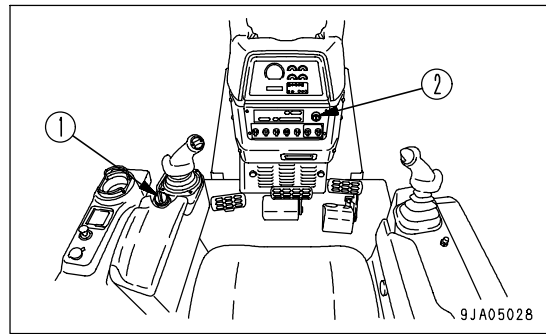


## STOPPING ENGINE

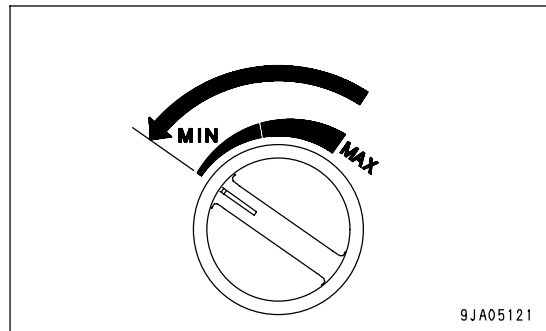
### NOTICE

If the engine is abruptly stopped before it has cooled down, engine life may be drastically shortened. Do not abruptly stop the engine except for an emergency.

If the engine has overheated, do not stop it abruptly, run it at medium speed allowing the engine to gradually cool down, then stop it.



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



2. Turn the key in starting switch (2) to the OFF position.  
The engine will stop.

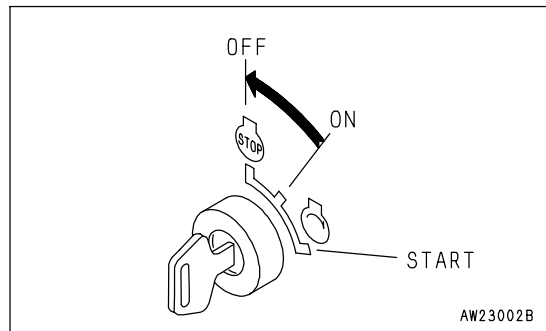
### REMARK

- When the key in starting switch (2) is turned to the OFF position, the engine stops, but the machine power supply is not cut immediately.

The power supply is maintained for several seconds to enable the controller to save the operating condition to memory and shuts down the system after that. The length of time that the power supply is maintained depends on the operating condition.

- Even when the cooling fan is being operated in reverse or in the cleaning mode, the machine power supply is not cut immediately when the key in starting switch (2) is turned to the OFF position.

The power supply is maintained for seven seconds to protect the hydraulic circuit. During that time, the fan operation confirmation lamp on the monitor panel flashes.



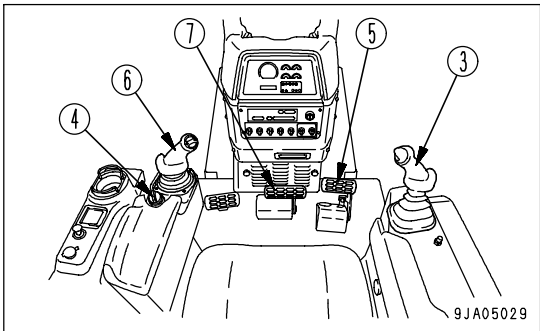
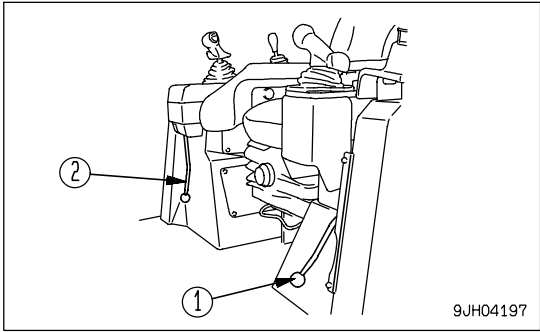
3. Remove the key from starting switch (2).

## MACHINE OPERATION

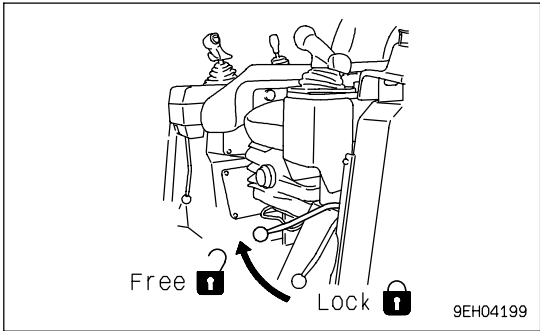
### MOVING MACHINE

#### **WARNING**

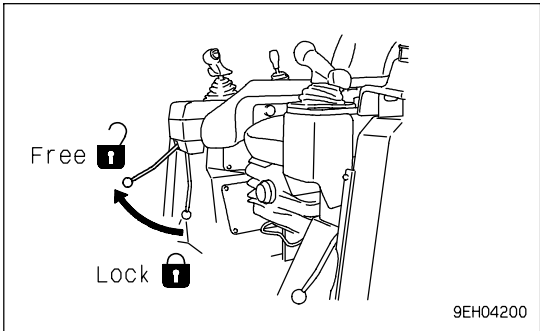
- When moving the machine, check that the area around the machine is safe, and sound the horn before moving.  
Do not allow anyone to enter the area around the machine.  
There is a blind spot at the rear of the machine, so be particularly careful when traveling in reverse.
- When moving the machine on a slope, always keep brake pedal (7) depressed even after releasing parking break lever (1).
- When moving the machine up a steep slope, turn fuel control dial (4) to the max. position, and keep brake pedal (7) and deceleration pedal (5) depressed. Then move joystick (steering, directional, and gearshift lever) (6) from the N position to the direction of travel and release brake pedal (7) slowly. When the travel speed rises, release deceleration pedal (5) slowly.



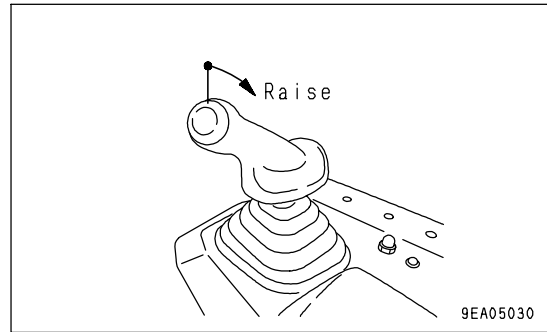
1. Set parking brake lever (1) to the FREE position.



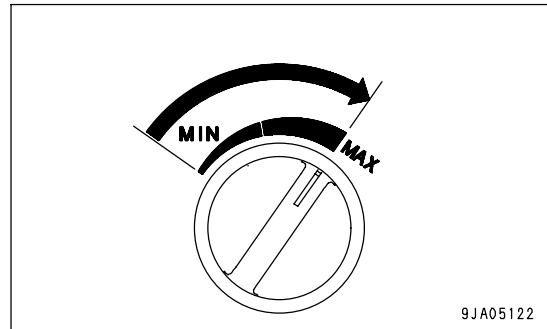
2. Set the work equipment lock lever (2) to the FREE position.



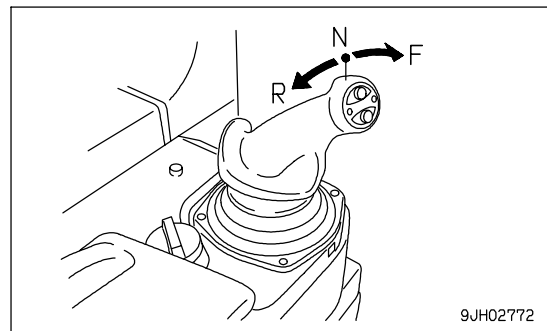
3. Put blade control lever (3) in the RAISE position to raise the blade 40 to 50cm (15.8 to 19.7 in) off the ground.



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



5. Move joystick (6) to the F (FORWARD) or R (REVERSE) position, gradually release the decelerator pedal (5) and allow the machine to move.

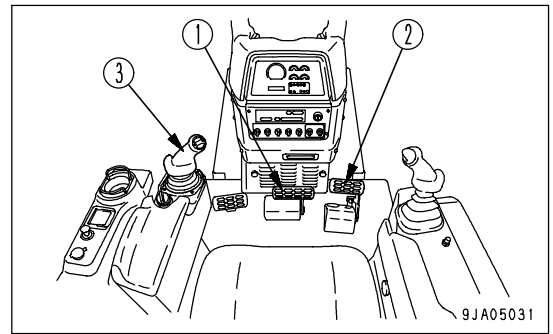
**REMARK**

For machines equipped with a backup alarm, check that the backup alarm sounds when joystick (6) is placed in REVERSE. If the alarm does not sound, please contact your Komatsu distributor.

## STOPPING MACHINE

**WARNING**

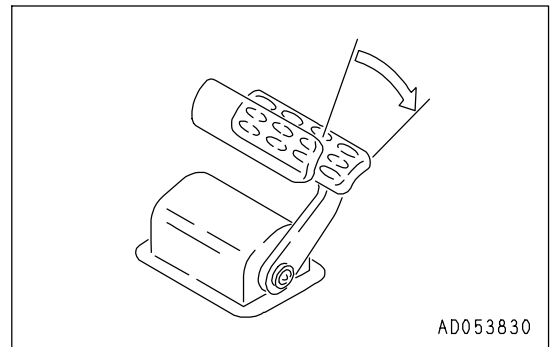
Avoid stopping suddenly. Give yourself ample room when stopping.



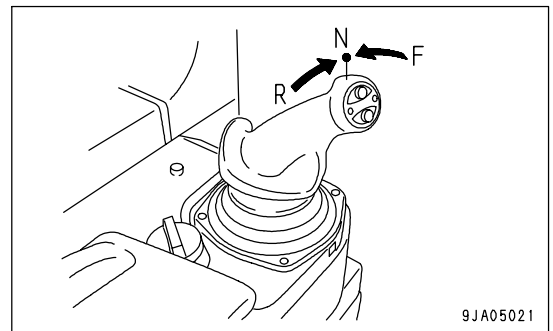
1. Depress brake pedal (1) to stop the machine.

**NOTICE**

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



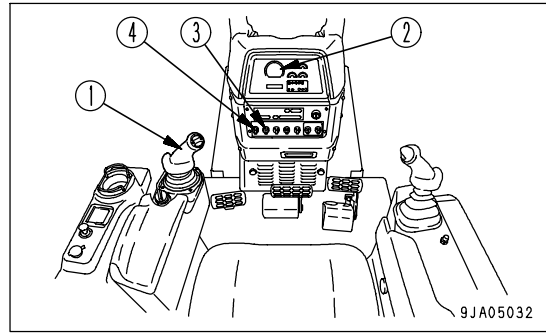
2. Move joystick (3) to the N (neutral) position, depress brake pedal (1) further, and stop the machine.



### SHIFTING GEARS

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

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



### GEARSHIFTING OPERATION

Press switch (a) or (b) to shift gears.

Up switch (a): Each time switch is pressed, transmission shifts up 1 range

Down switch (b): Each time switch is pressed, transmission shifts down 1 range

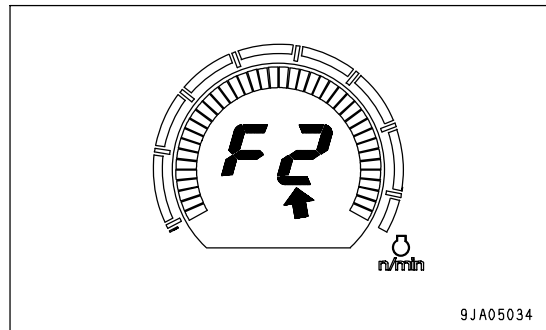
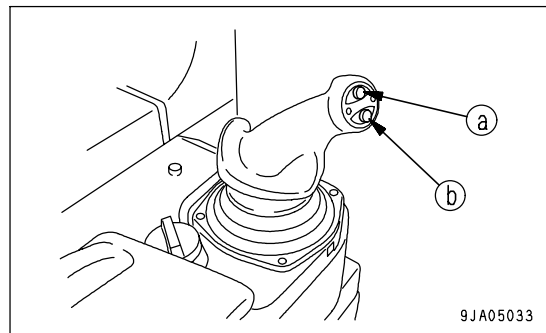
There are 3 forward and 3 reverse speed ranges.

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

#### REMARK

The present speed range is displayed in the center of display panel A (2).

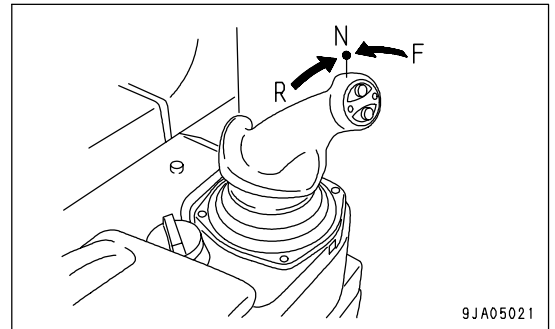
- 1st: 1 is displayed
- 2nd: 2 is displayed
- 3rd: 3 is displayed



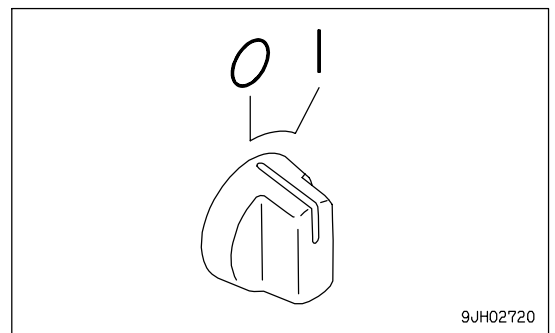
**GEARSHIFTING OPERATION USING PRESET MODE FUNCTION**

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

1. Set joystick (1) to the N position.



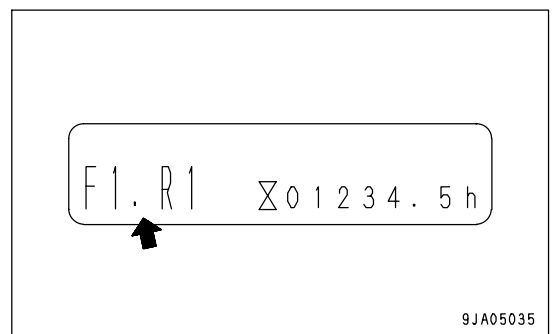
2. When preset mode switch (3) is set to the I position (ON), the function is actuated.



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

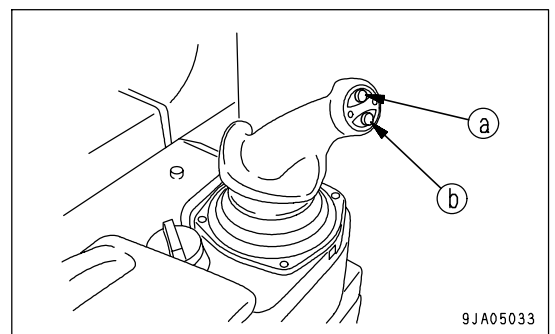
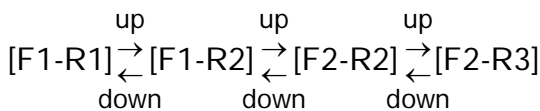
**REMARK**

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



4. If it is desired to select another mode, press up switch (a) or down switch (b) on steering, directional, and speed lever (1) and display the desired mode on control panel B (multi-information).

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



- Example of shift control when [F2-R2] mode is set.  
 When steering, forward-reverse, gear shift lever is set to F position, speed range F2 is automatically selected.  
 When steering, forward-reverse, gear shift lever is set to R position, speed range R2 is automatically selected.

**REMARK**

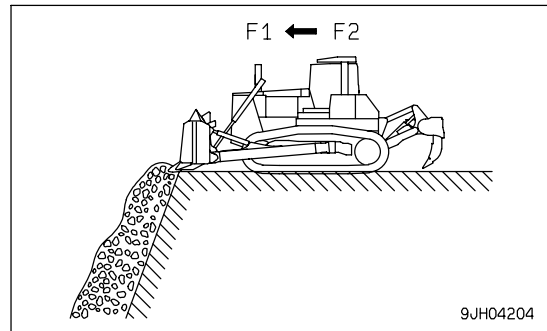
Even when the preset mode function is being actuated, it is possible to select the speed range by operating the up switch or down switch when the machine is traveling forward or in reverse.

However, the preset mode remains set as it is. If the steering, directional, and speed lever is returned to the N position and then operated again to the forward or reverse position, the set speed range is selected.

A particular advantage is that when the auto shift down function described below is being actuated, it is possible to save the trouble of shifting up when traveling in reverse after the transmission has shifted down during digging.

**AUTO DOWN SHIFT OPERATION**

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

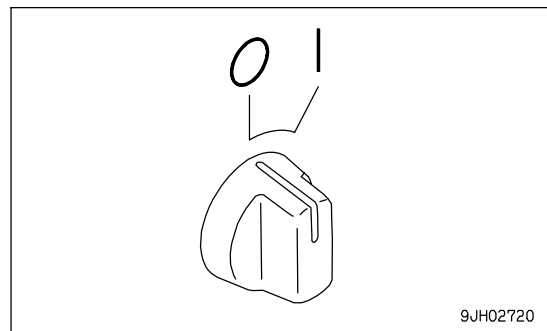


9JH04204

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

- Q (OFF) position: Canceled
- I (ON) position: Actuated

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



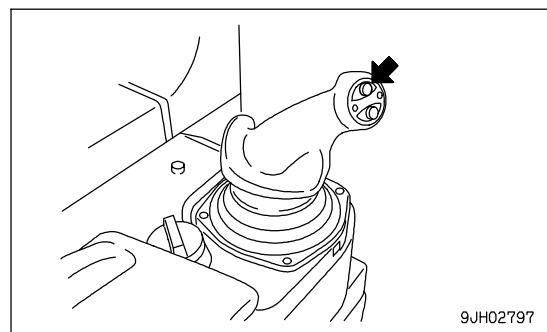
9JH02720

**REMARK**

When the preset mode is being actuated, to ensure safety, the system is set so that it does not shift up after the auto shift down has been actuated.

If it is desired to shift up, operate the up switch manually.

However, the preset mode remains set. If the steering, directional, and speed lever is returned to the N position and then operated again to the forward or reverse position, the preset speed range is again selected.



9JH02797

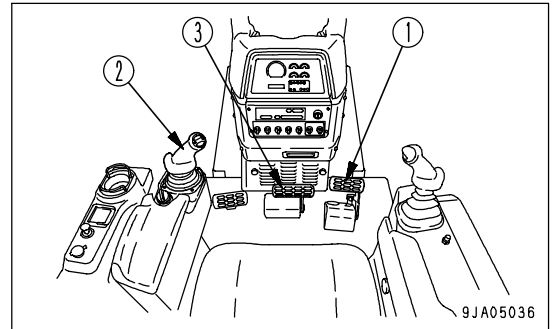
## SHIFTING BETWEEN FORWARD AND REVERSE

### WARNING

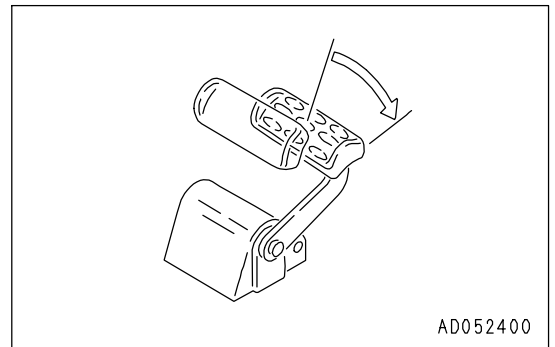
When switching between FORWARD and REVERSE, check first that the direction of travel is safe.

### CAUTION

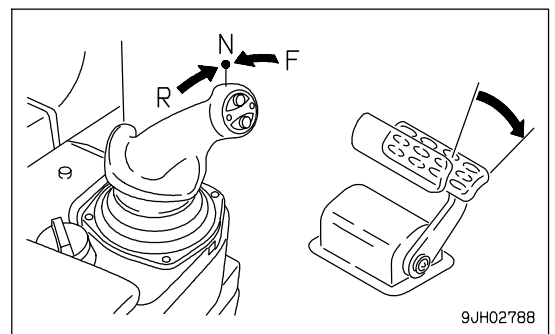
The travel direction can be changed without stopping the machine. Do not change it while the engine is running at the full speed, however, but depress the decelerator pedal to lower the engine speed before changing the travel direction for safety, comfort, and longer life of the power train.



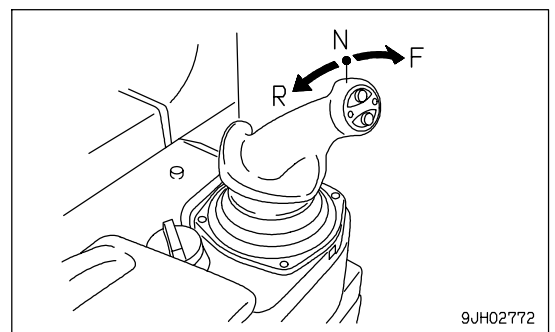
1. Depress decelerator pedal (1) to reduce the engine speed.



2. Move joystick (2) to the neutral position, reduce the speed, then depress brake pedal (3) and stop the machine.

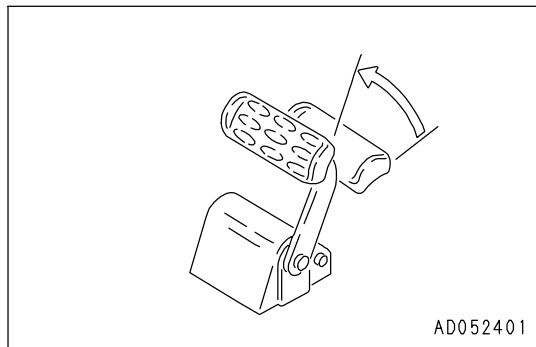


3. After depressing decelerator pedal (1), move steering, forward-reverse, gear shift lever (2) to the desired position.





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



AD052401

**REMARK**

For machines equipped with a backup alarm, check that the backup alarm sounds when joystick 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.

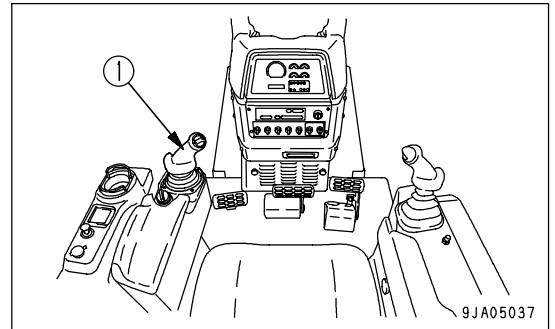
## NORMAL TURNING



### WARNING

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

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



## TURNING LEFT WHILE TRAVELING FORWARD

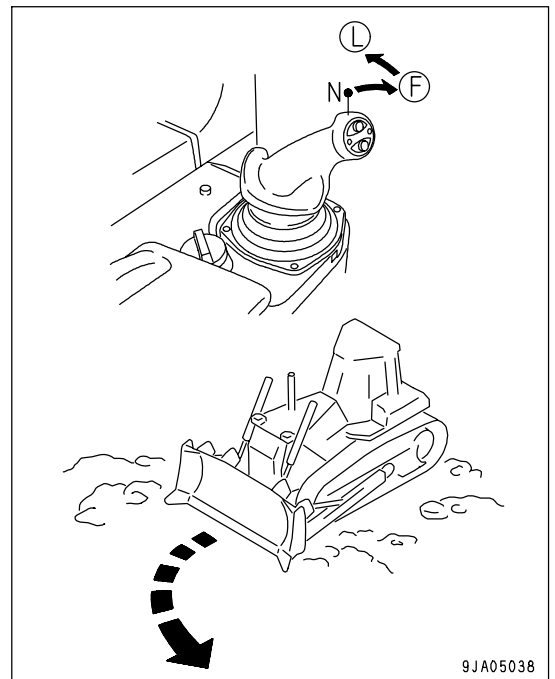
### NOTICE

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

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

### REMARK

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



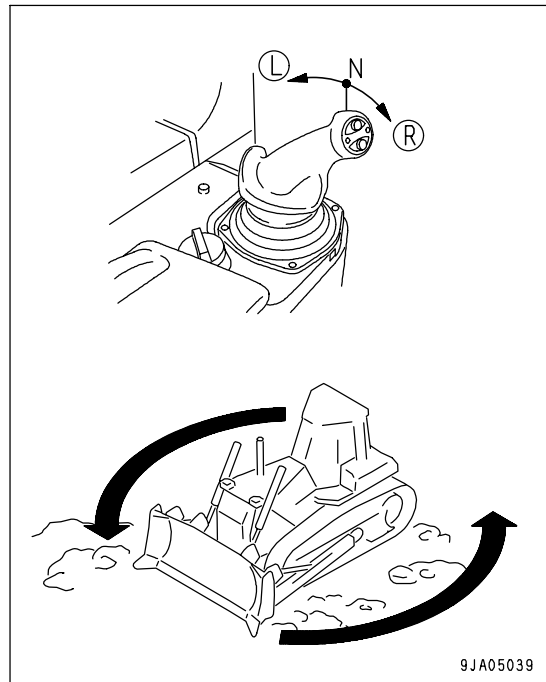
**WHEN MAKING PIVOT TURN TO LEFT WHILE TRAVELING****NOTICE**

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

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

**REMARK**

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



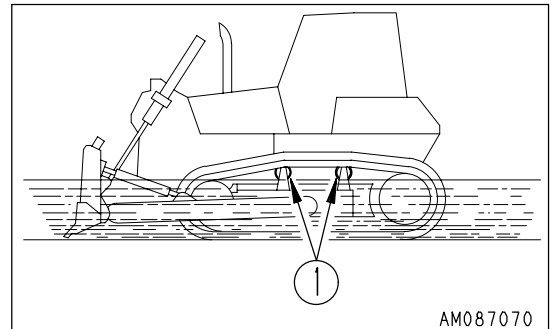
## PRECAUTIONS FOR OPERATION

### PAY ATTENTION TO GAUGES

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

### PERMISSIBLE WATER DEPTH

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



## PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

### METHOD OF USING DECELERATOR PEDAL

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

### USE ENGINE AS BRAKE

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

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

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

### BRAKING WHEN TRAVELING DOWNHILL

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

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

## PRECAUTIONS ON SLOPES

### BE CAREFUL OF FUEL LEVEL

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

### BE CAREFUL OF OIL LEVEL

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

### PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

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

## METHOD OF USING BRAKES

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

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

## REMARK

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

## IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS

(Machines equipped with cab)

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

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

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

(Machines equipped with cab)

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

## PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB AND ROPS STRUCTURES

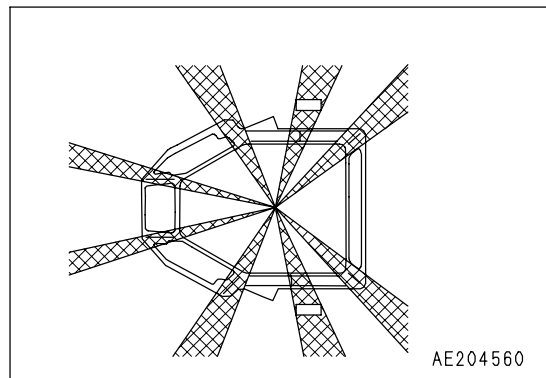
(Machines equipped with cab)



### WARNING

The cab structure may cause blind spots.

When operating, always be sure to check carefully that there is no obstacle or worker in the surrounding area.

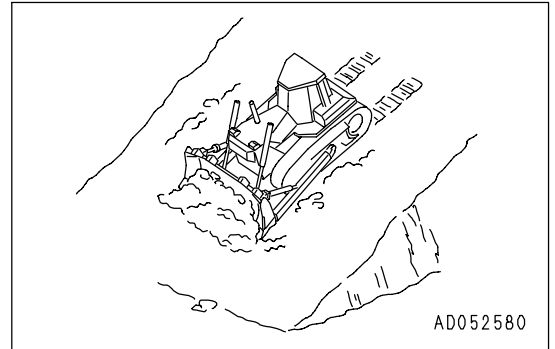


## WORK POSSIBLE USING BULLDOZER

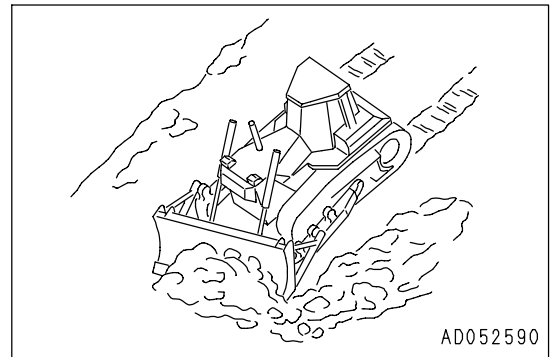
In addition to the following, it is possible to further increase the range of applications by using various attachments.

### DOZING

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



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

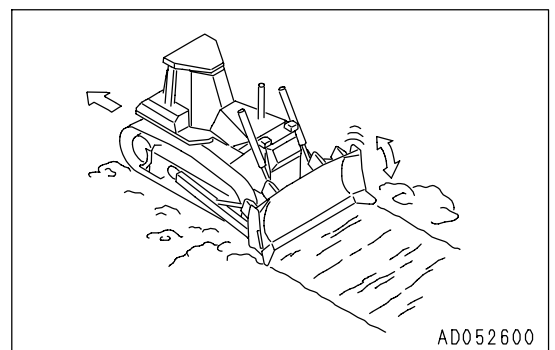


### SMOOTHING

#### NOTICE

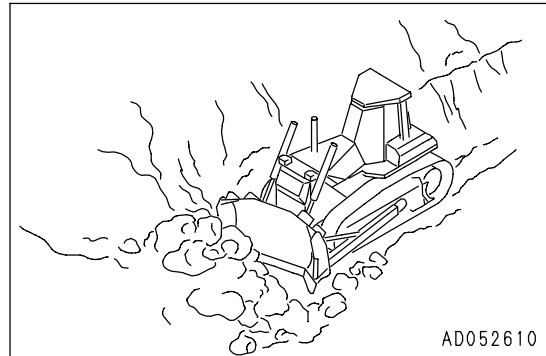
**Avoid smoothing on rocky or stony ground. It can damage the blade.**

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



### CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

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



### FELLING TREES, REMOVING STUMPS

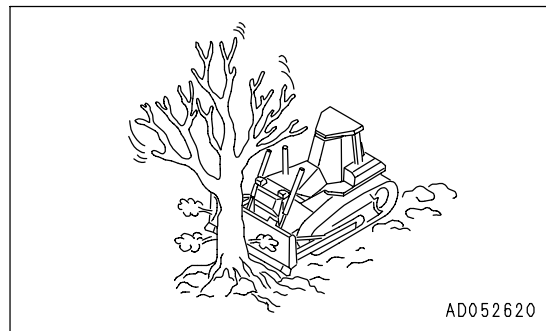
#### NOTICE

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

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

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

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



## ADJUSTING POSTURE OF WORK EQUIPMENT

### METHOD OF ANGLING BLADE

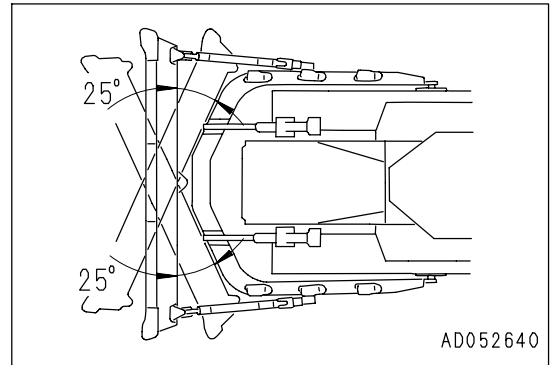
Angledozer only

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

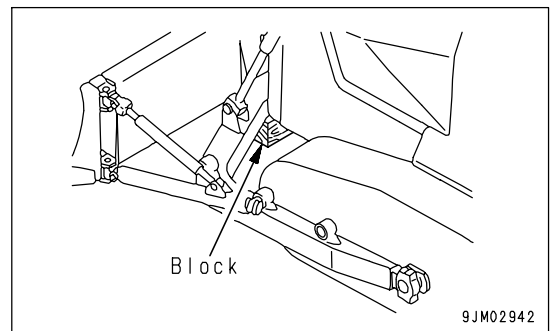


### WARNING

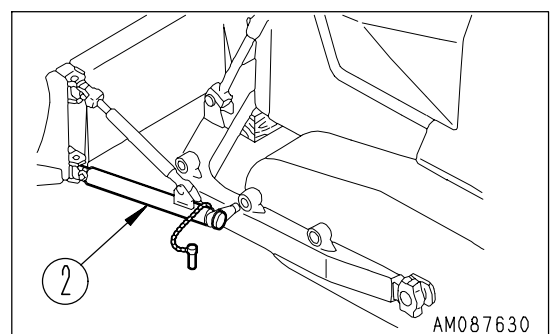
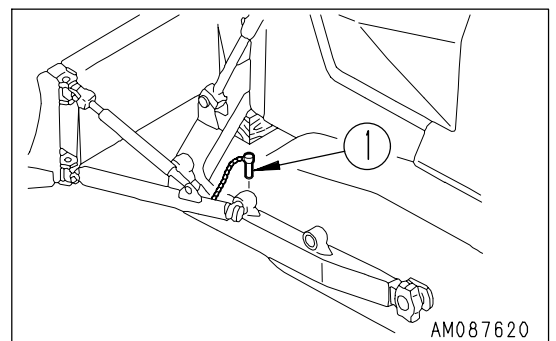
- When adjusting the amount of angling, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.
- Be careful when removing arm (2). After arm (2) is removed, the blade can move freely.



1. Raise the blade 400 to 500 mm (15.8 to 19.7 in) above the ground, then put blocks under the frame so that the blade does not come down.

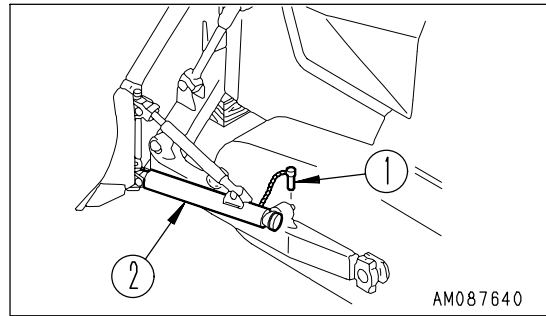


2. Remove pins (1) on the left and right sides, then remove arm (2) from the frame.





3. Insert arm (2) into the desired position on the bracket on top of the frame (3 places on each side), and insert pins (1).



### ADJUST AMOUNT OF TILT

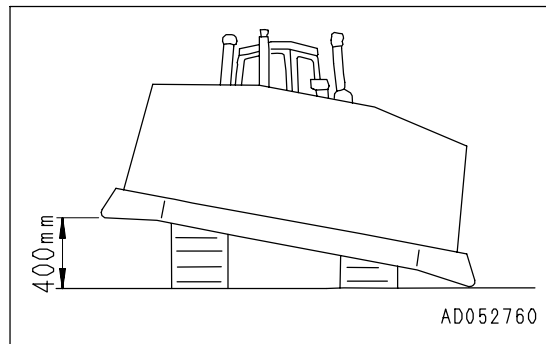
Angledozers only

## ! WARNING

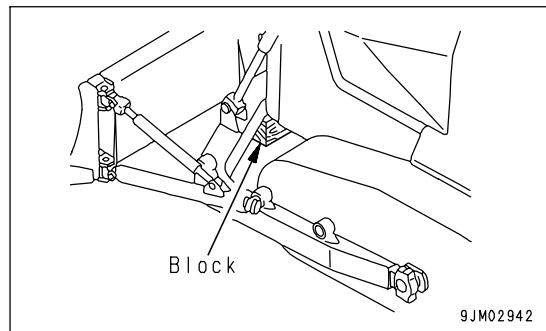
When adjusting the amount of tilt, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.

### NOTICE

The maximum amount of tilt is 400 mm (15.8 in). Be sure not to exceed 400 mm (15.8 in).



1. Raise the blade 400 to 500 mm (15.8 to 19.7 in) above the ground, then put blocks under the frame so that the blade does not come down.



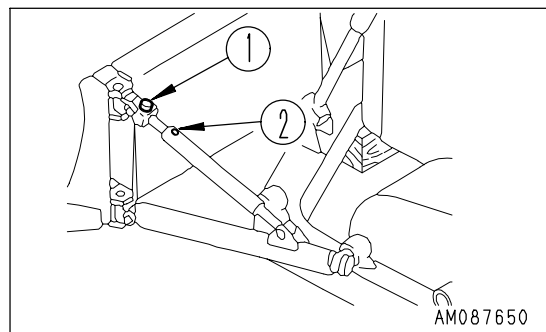
2. Loosen the bolt (1) of the brace, insert a suitable bar into hole (2) of the brace, and turn it.

### REMARK

When turning the brace with bar, keep the blade above the ground.

- Right tilt: Make right side shorter, left side longer
- Left tilt: Make left side shorter, right side longer

3. Tighten set bolt (1).



**ADJUST ANGLE OF BLADE EDGE**

(Power tiltdozer only)



**WARNING**

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

Adjust the angle ( $\theta$ ) of the blade edge to match the type of soil.

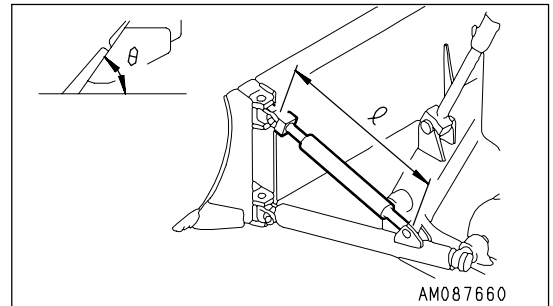
**ANGLEDZOZER**

The angle of the blade edge of the angledozer cannot be adjusted.

The standard for the cutting angle is 55 degrees.

The standard for the distance between the joints is shown below ( L ).

Model	Standard	Use Range
D65EX	1127mm (44.4in)	1117-1137mm (44.0-44.8in)
D65PX	1096mm (43.2in)	1086-1106mm (42.8-43.6in)



**POWER TILTDOZER**

Power tiltdozer with screw-adjustable tilt brace.

Turn the brace with bar handle (1) and the distance ( $\ell$ ) between the joints to change the cutting angle ( $\theta$ ) as follows.

INCREASE distance ( $\ell$ ) to INCREASE angle ( $\theta$ )  
 DECREASE distance ( $\ell$ ) to DECREASE angle ( $\theta$ ).

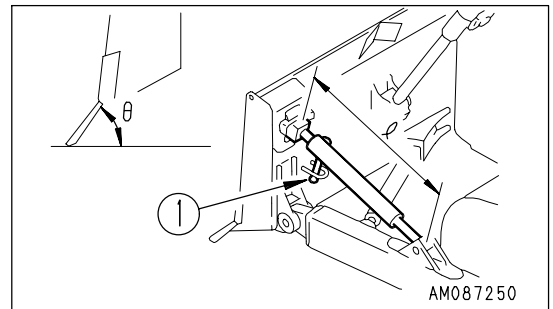
The standard for the cutting angle is 55 degrees.

The standard for the distance between the joints is shown below.

D65EX : 1150 mm (45.31 in)

D65PX : 1146 mm (45.15 in)

D65WX : 1150 mm (45.31 in)



**REMARK**

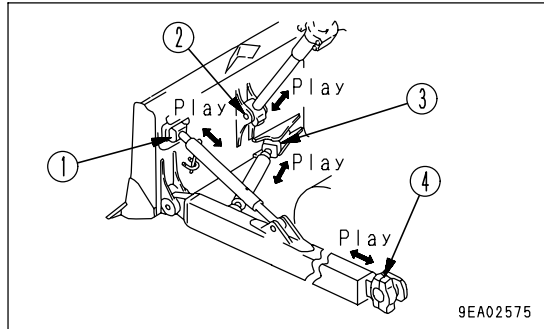
It is impossible to adjust blade angle of stable tilt brace.

The standard for the cutting angle is 55 degrees.

### ADJUSTING SHIMS IN ASSEMBLING WORK EQUIPMENT

1. When assembling the work equipment, adjust plays in various parts to the optimum values.

Shim adjusting position		(1) Tilt	(2) Lift	(3) Center	(4) Trunnion
Item					
Optimum value	mm (in)	0.2 - 0.5 (0.008 - 0.020)	0.2 - 0.5 (0.008 - 0.020)	0.2 - 0.5 (0.008 - 0.020)	0.2 - 1.0 (0.008 - 0.039)
Thickness of standard shims	mm (in)	5 (0.197)	4 (0.158)	5 (0.197)	10 (0.4)



2. After the assembly, grease shim adjusting positions (1) to (3) and check that each part turns smoothly.

### ADJUSTING TENSION OF CENTER BRACE

(Power tilt dozer only)

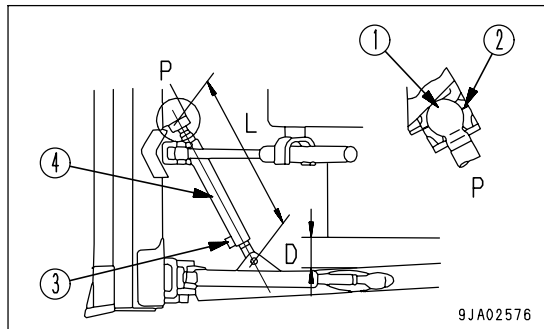
(Powertilt, Power pitch dozer only)

In case the work equipment assembly is disassembled for transportation and reassembled at a worksite, tension of the center brace has to be adjusted anew. Otherwise the bushing at the connecting part of blade and straight frame will likely slip off, allowing sand and dirt to enter the bushing, which eventually leads to premature wear or damage of the bushing. Make this adjustment as follows:

## ! WARNING

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

1. Adjust with shim (2) so that the play of ball joint (1) is 0.2 to 0.5 mm (0.008 to 0.020 in).
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 49 N·m (2.5 to 5 kgf·m, 18.1 to 36.2 lbf·ft) (Blade at FLOAT)

Standard distance (L) between joints is shown below.

D65EX : 995mm (39.2in)

D65PX : 992mm (39.1in)

D65WX : 995mm (39.2in)

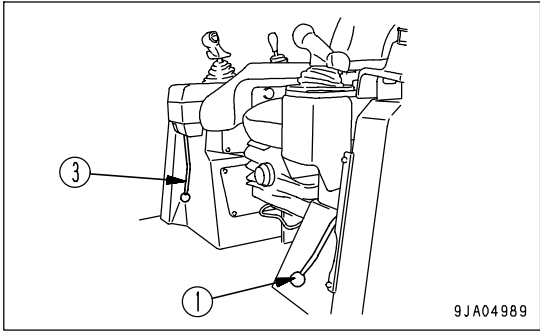
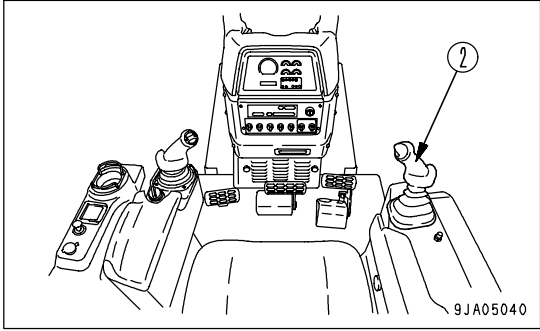
6. Tighten bolt (3).

Tightening torque: 490.3 to 608 N·m (50 to 62 kgf·m, 361.7 to 448.4 lbf·ft)

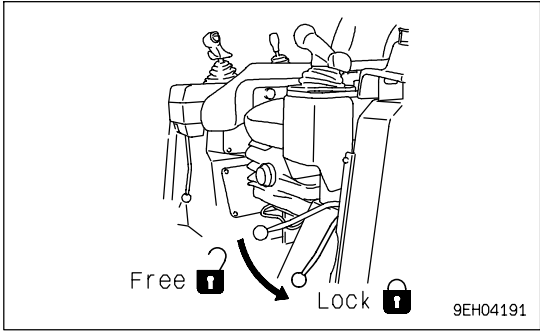
**PARKING MACHINE**

**⚠ WARNING**

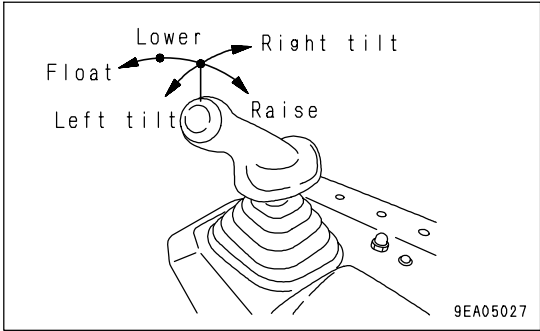
- When stopping the machine, select flat hard ground and avoid dangerous places.  
If it is unavoidably necessary to park the machine on a slope, place the parking brake lever in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the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



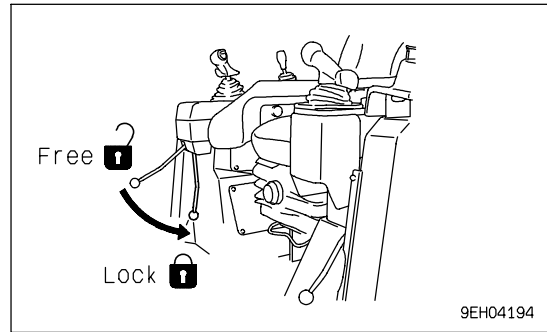
1. Stop the machine. For details, see "STOPPING MACHINE (PAGE 3-93)".
2. Set parking brake lever (1) to the LOCK position and apply the parking brake.



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

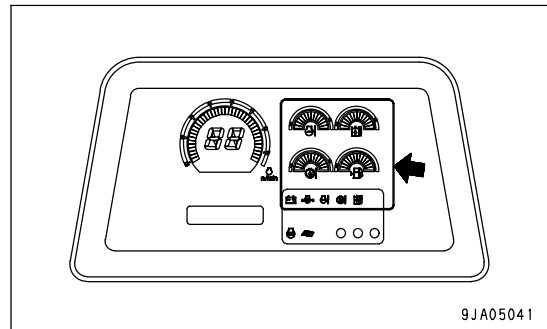


4. Set the work equipment lock lever (3) in the LOCK position.



### CHECK AFTER STOPPING ENGINE

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



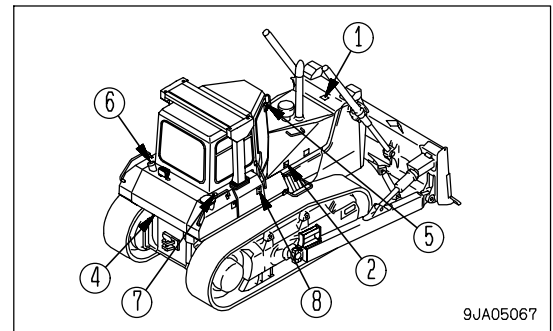
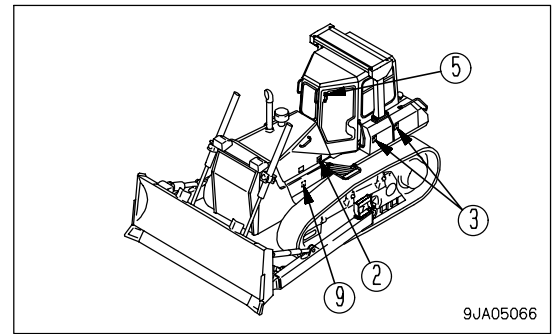
### CHECK AFTER FINISHING WORK

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

## LOCKING

To prevent vandalism, there are locks at the following places.  
Places that can be locked with the starting switch key.

- Top cover at front of chassis (1)
- Right and left engine side covers (2)
- Battery inspection cover (3)
- Inspection cover for fuel tank drain valve(4)
- Cab door opener (5) (machines equipped with cab)
- Fuel tank filler cap (6)
- Hydraulic tank filler cap (7)
- Power train filter inspection cover (8)
- Water separator inspection cover (9)  
(Machines equipped with water separator)

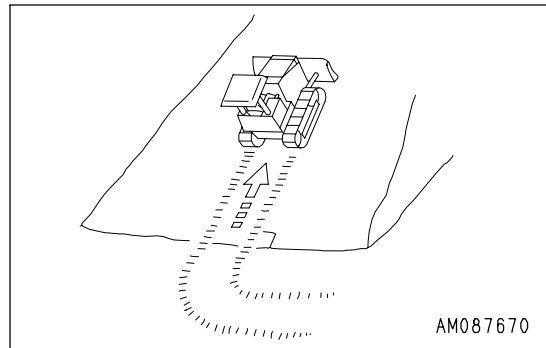


### TIPS FOR LONGER UNDERCARRIAGE LIFE

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

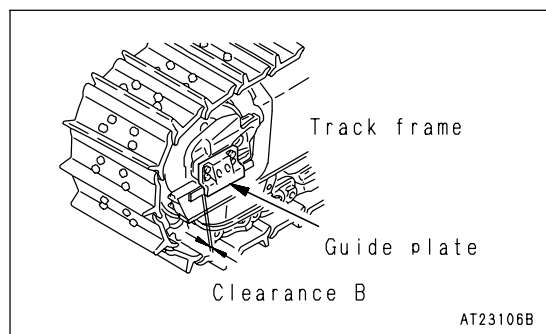
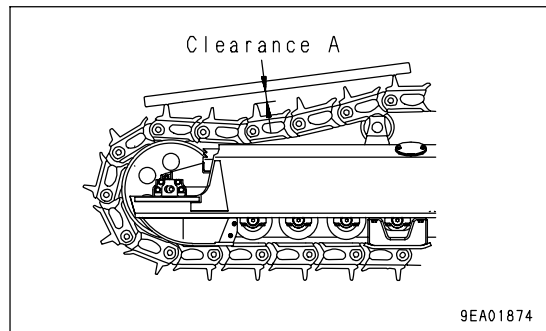
### OPERATION METHOD

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



### INSPECTION AND ADJUSTMENT

- Properly adjust the track tension.  
The tension should be measured at clearance (A) between the idler and carrier roller shown in the right diagram - usually 20 to 30 mm (0.8 to 1.2 in) at this point. For rocky terrain, tighten the tracks slightly. In clay or sandy areas, loosen them slightly. (For inspection and adjustment procedures, refer to "CHECK TRACK SHOE TENSION, ADJUST (PAGE 4-26)")
- 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 4-37)".)



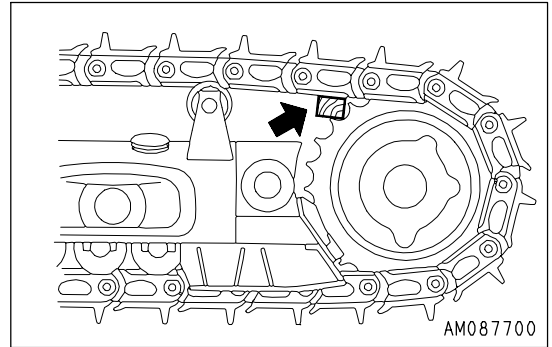
**INSPECTION AND REPAIR**

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.

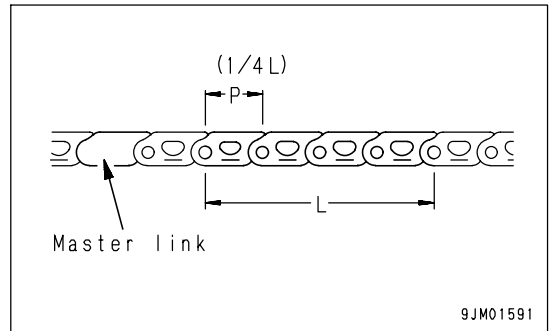
**MEASURING LINK PITCH**

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): 203 mm (8.0 in)
  - Link pitch limit for turning: 206 mm (8.1 in)

There is no link window on the master link.



**REMARK**

The measured value under decimal of link pitch is different from the basic value depending upon the precision of measure or the tolerance of product even if it isn't worn out.

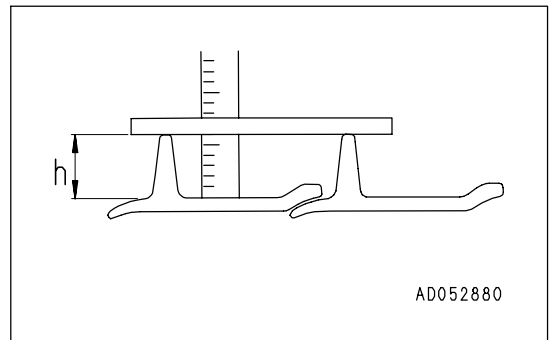
Don't judge it's worn out too soon, do it with the trend of measured value after that.

**MEASURING HEIGHT OF GROUSER**

(D65EX, D65WX)

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

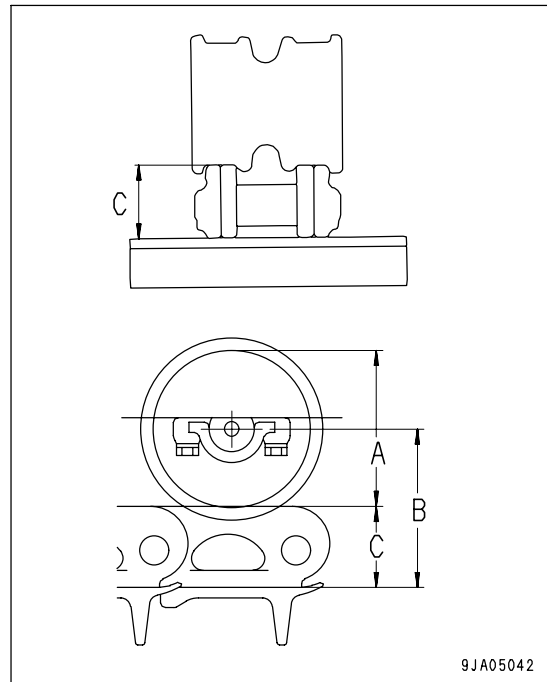
- Standard height (h): 65 mm (2.6 in)
- Repair limits: 25 mm (1.0 in)





**MEASURING OUTSIDE DIAMETER OF TRACK ROLLER**

1. Measure the height (dimension C) of the link tread as shown in the diagram.
2. Stop machine at position where link tread, whose size C has been measured completely, contacts roller tread. Then measure size B.
3. Calculate outside diameter of tread (size A):  
 $A = (B - C) \times 2$ 
  - Standard size (A): 210 mm (8.3 in)
  - Repair limits: 172 mm (6.8 in)



## TRANSPORTATION

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

### TRANSPORTATION MEANS

As a rule, transport the machine on a trailer.

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

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

### REMOVING CAB

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

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

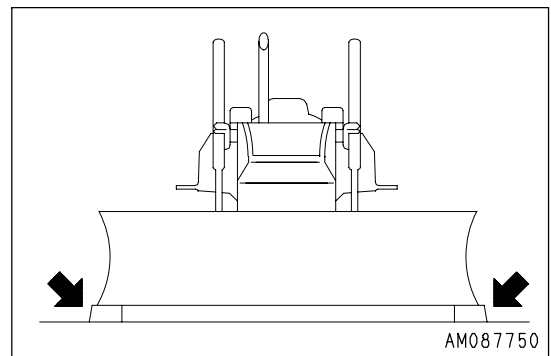
### PRECAUTIONS WHEN REMOVING WORK EQUIPMENT

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.

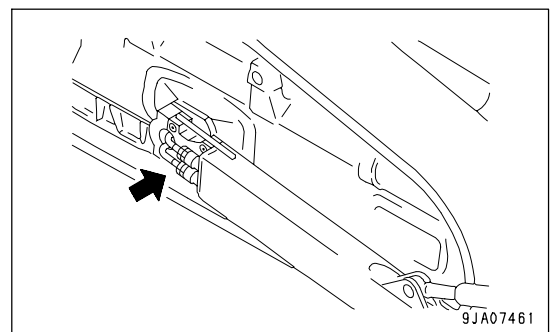
1. Lower the blade to the ground and set it horizontal to the ground surface.

#### REMARK

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



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



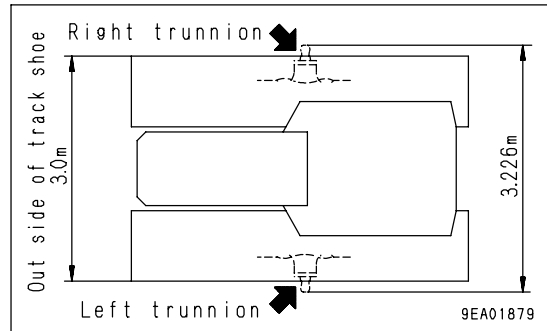
- Remove the left and right trunnions.  
(D65PX,D65WX)

**REMARK**

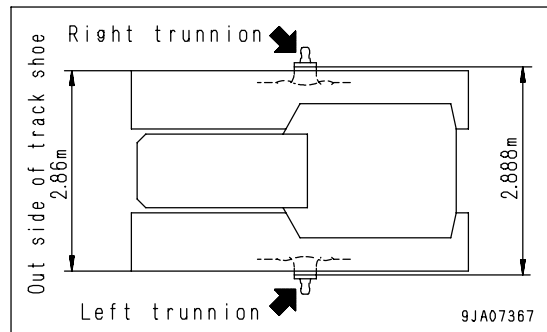
- In the case of D65PX and D65WX, remove the left and right trunnions.
- In the case of D65EX, the width including the left and right trunnions is within 3.0 m, so there is no need to remove them.
- In the case of D65EX with 3 m semi-U blade, the blade width is within 3.0 m, so there is no need to remove the work equipment.

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

(D65PX)



(D65WX)



**PRECAUTIONS WHEN REMOVING ROPS**

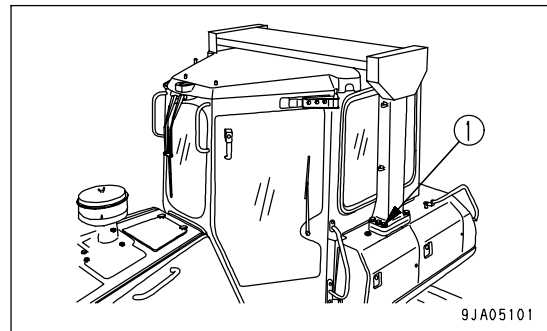
When removing ROPS for transporting the machine, do as follows:

**NOTICE**

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

Tightening torque: 785 to 980 N·m (80 to 100 kgf·m, 578.6 to 723.3 lbf·ft)

- Loosen bolts (1) and remove ROPS.



## LOADING, UNLOADING WORK

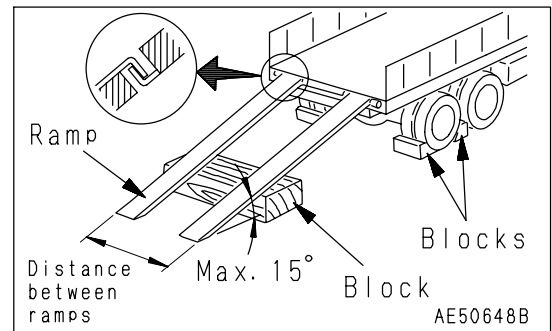
**WARNING**

- Since loading and unloading of the machine is dangerous, be extremely careful.
- When loading or unloading the machine, operate it slowly with the engine speed low and the transmission in the 1st gear.
- Use ramps having sufficient width, length, thickness, and strength. Install them securely and set their angle to 15° or less. If the ramps are deflected appreciably, reinforce them with blocks.
- Perform the loading work of the machine on firm, level ground. Secure sufficient distance between the shoulder of the road and the trailer.
- Remove mud from the undercarriage of the machine so that the machine will not slip sideways on the ramps. In addition, remove water, snow, ice, grease, oil, etc. from the ramps.
- Never steer the machine on the ramps, since steering on the ramps can cause the machine to tip over. If it is necessary to change the travel direction, return to the ground or to the bed of the trailer, then change the travel direction.
- The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.

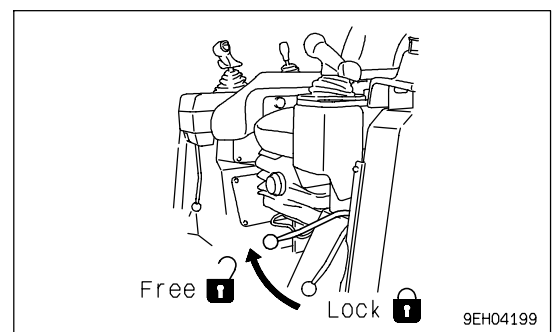
When loading or unloading, always use ramps or a platform. Proceed as follows.

**LOADING WORK**

1. Load and unload on firm level ground only.  
Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.  
Make the slope of the ramps a maximum of 15°.



3. Start the engine.  
In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (PAGE 3-88)", in this manual.
4. Set parking brake lever to the FREE position.
5. Set the transmission in the 1st gear and run the engine at low idle.
6. Set the travel direction toward the ramps and drive slowly.
7. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
8. Stop the machine at the specified position on the trailer.



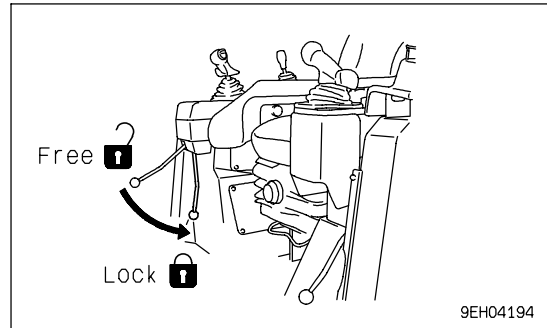
## SECURING MACHINE

### NOTICE

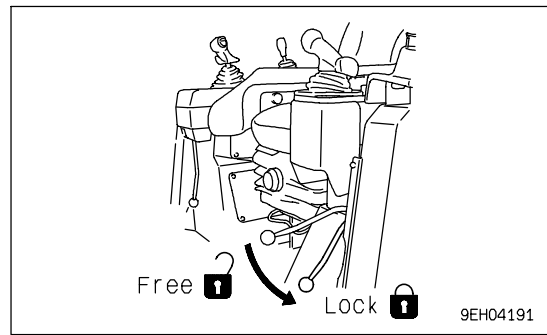
Be sure to lower the car radio antenna to the stow position (if the machine is equipped with a cab).

Load the machine onto a trailer as follows:

1. Lower the work equipment slowly.  
(When transporting with work equipment installed)
2. Set the work equipment lock lever to the LOCK position securely.  
(When transporting with work equipment installed)



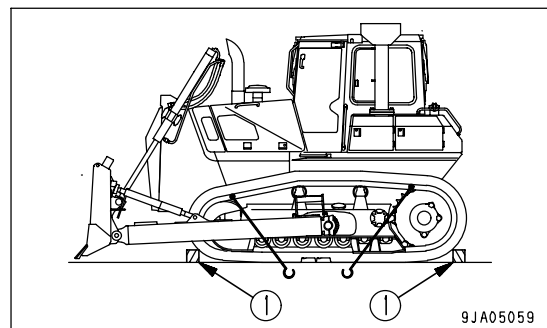
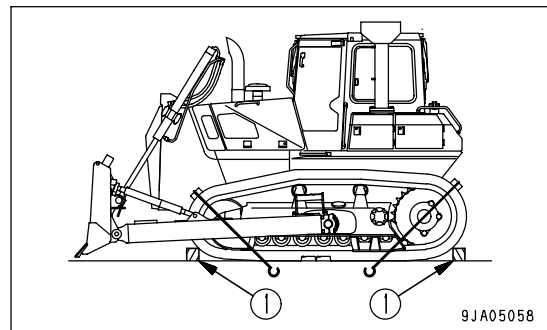
3. Set the parking brake lever to the LOCK position.
4. Stop the engine, then remove the key from the starting switch.



5. Fix the machine as explained below so that it will not move during transportation.

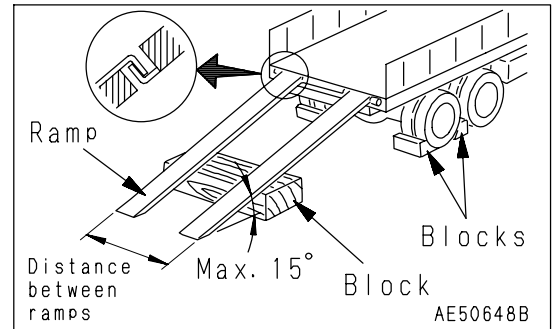
In particular, fix the machine securely to prevent it from slipping sideways.

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

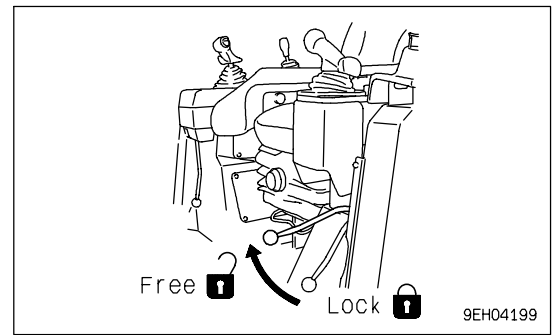


**UNLOADING WORK**

1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.  
Make the slope of the ramps a maximum of 15°.
3. Remove the chains and wire ropes fastening the machine.



4. Start the engine.  
In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (PAGE 3-88)", in this manual.
5. Set parking brake lever to the FREE position.
6. Set the transmission in the 1st gear and run the engine at low idle.
7. Set the travel direction toward the ramps and drive slowly.
8. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
9. Drive down the ramps slowly and carefully until the machine leaves the ramps perfectly.



## LIFTING MACHINE



### WARNING

- Do not lift the machine with any worker on it.
- Use wire ropes having sufficient strength for the weight of the machine.
- Lift the machine only in the position shown below. If it is lifted in another position, it may be unbalanced.
- Lift the machine level.

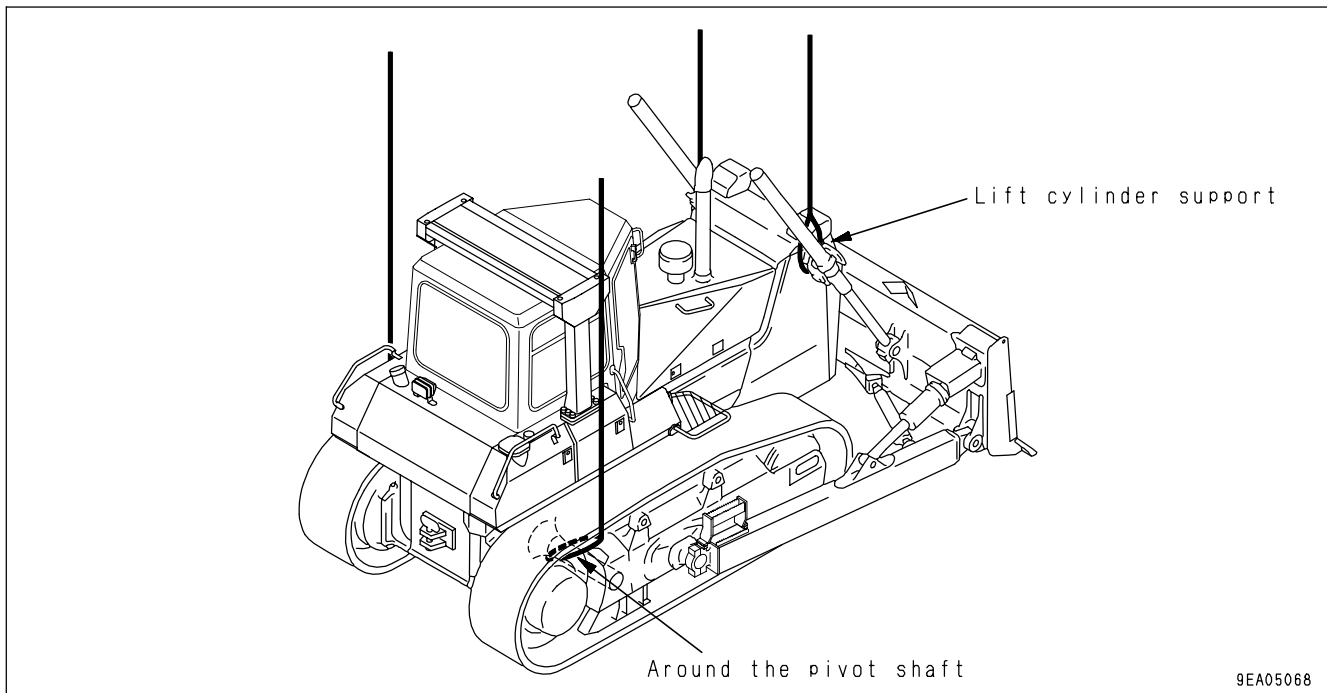
### NOTICE

The lifting procedure applies to machines with standard specifications.

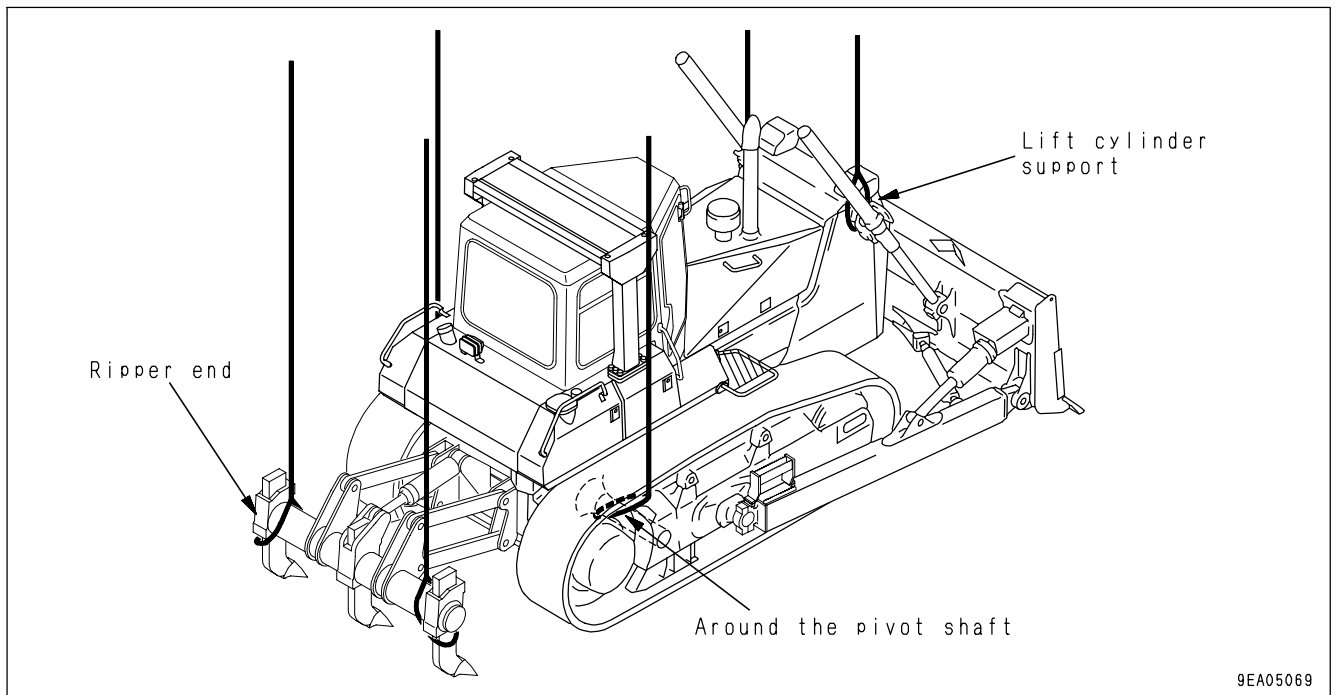
The method of lifting differs according to attachments and options actually installed on the machine. For the proper lifting procedures, contact your Komatsu distributor.

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

### PROCEDURE FOR LIFTING OPERATIONS



For machine equipped with ripper

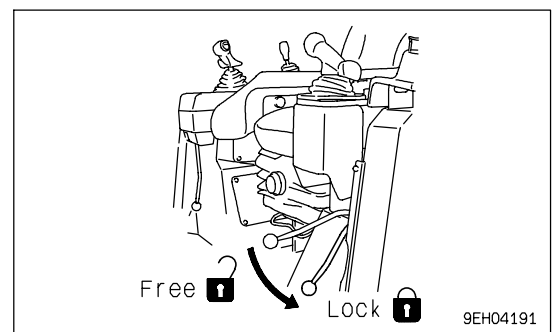


When lifting the machine, stop it on a level place, then observe the following procedure.

1. Stop the engine and set the parking brake lever to the LOCK position.
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 spreaders and bars having sufficient width so that they will not touch the machine.



3. After setting the wire ropes, lift up the machine and stop at 100 to 200 mm (3.9 to 7.9 in) above the ground, and check that the wire ropes are not slack and the machine is level, then lift up slowly.

## TRAVELING ON ROADS

- When traveling on paved roads, use flat shoes to protect their surface.  
Even when travelling a short distance, always place boards to protect the road surface.

#### REMARK

Note that the asphalt road becomes soft in summer.



## 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 oil with low viscosity for all components. For details of the specified viscosity, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-11)".

#### COOLANT



### WARNING

- Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large amounts of fresh water and see a doctor at once.
- When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact your Komatsu distributor or request a specialist company to carry out the operation. Antifreeze is toxic. Do not let it flow into drainage ditches or spray it onto the ground surface.
- Antifreeze is flammable. Do not bring any flame close. Do not smoke when handling antifreeze.

#### NOTICE

- Use Komatsu Supercoolant wherever available, or use permanent type antifreeze coolant.
- Never use methanol, ethanol, or propanol-based antifreeze.
- Do not use any water leakage prevention agent, either alone, or in combination with antifreeze.
- Do not mix one brand of antifreeze with a different brand.

For details on the amount of antifreeze mixture and on when to change the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-23)".

## BATTERY

**WARNING**

- The battery generates flammable gas. Do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on the bodywork, wash it off immediately with water.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.
- Battery electrolyte is toxic. Do not let it flow into drainage ditches or spray it on to the ground surface.

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%. Insulate it against cold temperature to ensure the machine can be started easily the next morning.

**REMARK**

Measure the specific gravity and calculate the charging rate from the following conversion table.

Charging Rate (%)	Electrolyte Temperature (°C)	20	0	-10	-20
	100		1.28	1.29	1.30
90		1.26	1.27	1.28	1.29
80		1.24	1.25	1.26	1.27
75		1.23	1.24	1.25	1.26

- As the battery capacity drastically drops in low temperatures, cover or remove the battery from the machine, store the battery in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add water after the day's work to prevent diluted electrolyte in the battery from freezing during the night.

**AFTER COMPLETION OF WORK**

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

- Remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rod clean to prevent damage to the seal caused by mud, dirt, or drops of water on the rod from getting inside the seal.
- Park the machine on hard, dry ground.

If this is impossible, park the machine on boards.

The boards prevent the tracks from freezing to the ground, and allow the machine to be moved the next morning.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to capacity. This minimizes moisture condensation in the tank when the temperature drops.

**AFTER COLD WEATHER**

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

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

For details, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-11)".

## LONG-TERM STORAGE

### BEFORE STORAGE

When keeping in long-term storage (more than one month), store as follows.

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank. This prevents moisture from collecting.
- Lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Place all control levers in the neutral position, set the work equipment lock lever and parking brake lever in the LOCK position, and set the fuel control dial to the low idle position.
- To prevent corrosion, be sure to fill the cooling system with Supercoolant (AF-NAC) or permanent type antifreeze (density between 30% and 68%).

### DURING STORAGE



#### WARNING

If it is necessary to perform the rust-prevention operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- During storage, operate and move the machine for a short distance once a month so that a new film of oil will coat moving parts. At the same time, also charge the battery.
- Before operating the work equipment, wipe the grease off the hydraulic piston rod.
- For machines equipped with an air conditioner, run the air conditioner.

### AFTER STORAGE

#### NOTICE

If the machine has been stored without carrying out the monthly rust-prevention operation, consult your Komatsu distributor before using it.

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

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

## TROUBLESHOOTING

### AFTER RUNNING OUT OF FUEL



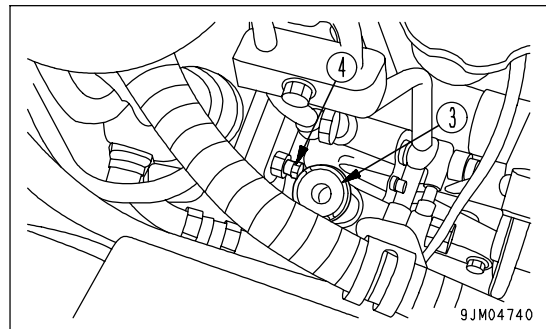
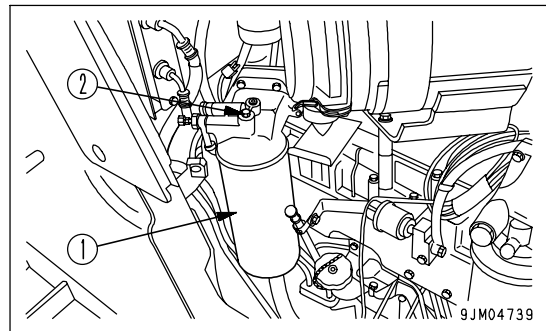
#### WARNING

When air bleed plug (2) at the top of the fuel filter head or supply pump air breather (4) are removed, the system is still under pressure, so fuel may spurt out. Loosen these parts slowly before opening them.

When starting after running out of fuel, fill the filter cartridge with fuel and bleed the air from the fuel system before starting.

#### NOTICE

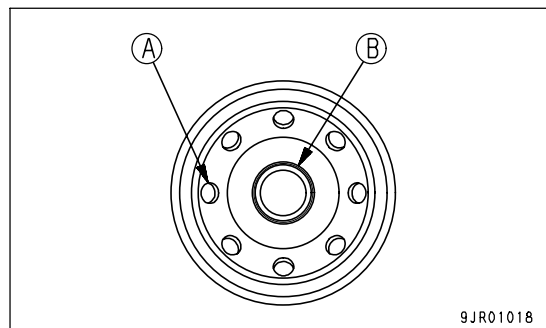
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle, so problems may be caused by dust or dirt getting in. When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.
- If no clean fuel is available, bleed the air with priming pump (3) without removing the fuel cartridge.



1. Remove fuel filter cartridge (1), fill the inside of the filter with clean fuel, taking care not to let dirt or dust get in, then install it again.

#### NOTICE

- When filling with fuel, use clean fuel and be careful not to let any dust or dirt get in. Portion (B) at the center is the clean side, so be particularly careful not to let any dust or dirt get in.
- When adding fuel, always add from small hole (A) at eight places on the dirty side.



2. Loosen air bleed plug (2) at the fuel filter head.
3. Loosen the knob of priming pump (3), pump the knob, and check that fuel comes out from air bleed plug (2).  
After checking, tighten the plug.

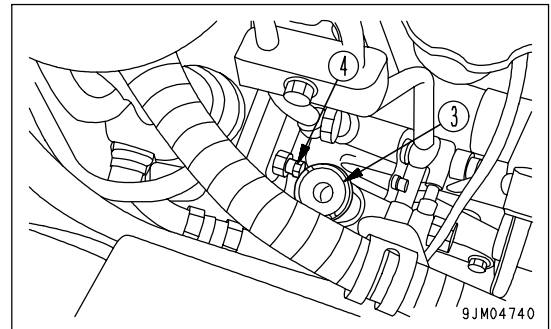
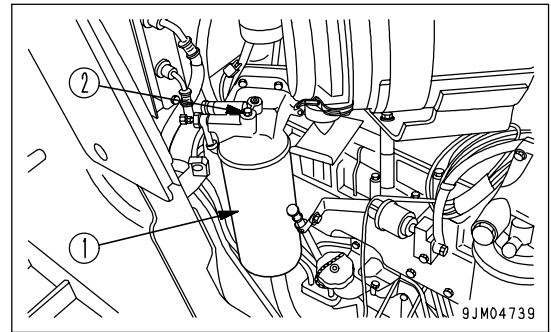
Tightening torque: 7.8 to 9.8 N·m (0.8 to 1 kgf·m, 5.8 to 7.2 lbf)

4. Loosen air bleeder (4) of the supply pump.
5. Pump priming pump (3) until no more bubbles come out with the fuel from air bleeder (4), then tighten air bleeder (4).

Tightening torque: 4.9 to 6.9 N·m (0.5 to 0.7 kgf·m, 3.6 to 5.1 lbf)

6. Continue pumping (approx. 50 times) until the priming pump (3) becomes stiff and the overflow valve release sound becomes continuous.

7. Push the knob of priming pump (3) in and tighten it.



8. If the air is not bled properly, return to Step 3 and bleed the air again.
9. For normal starting operations, turn key in the starting switch to the START position to start the engine.

## MACHINE TOWING METHOD



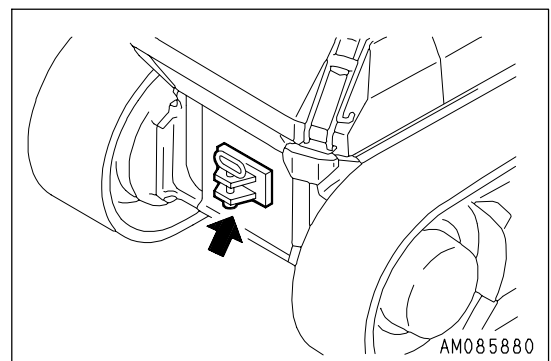
### WARNING

- 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 level and align it with the track frame.
- Tow the machine slowly.

### NOTICE

The maximum towing capacity for this machine is 14,275 kg (140,000 N).  
Always carry out towing operations within the maximum towing capacity.

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

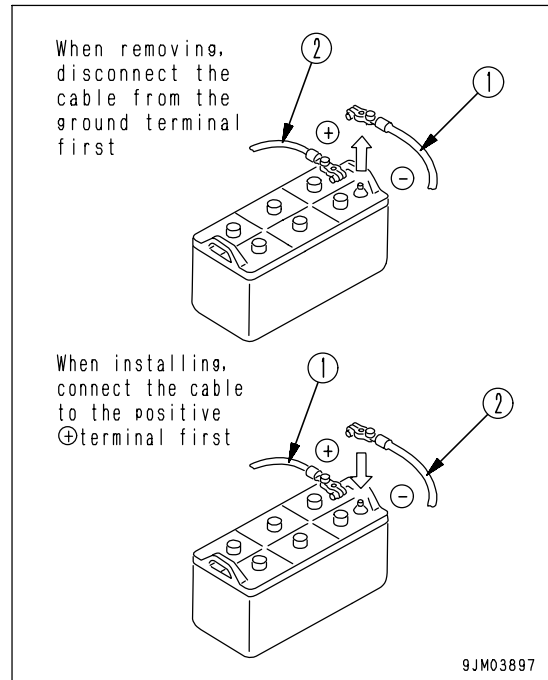


## IF BATTERY IS DISCHARGED



### WARNING

- It is dangerous to charge a battery when mounted on a machine. Make sure that it is dismantled before charging.
  - When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
  - The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
  - Battery electrolyte is dilute sulfuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, immediately wash it off with a large amount of water. If it gets in your eyes, wash it out with fresh water and consult a doctor.
  - When handling batteries, always wear protective goggles and rubber gloves.
  - When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first.
- If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
  - When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.



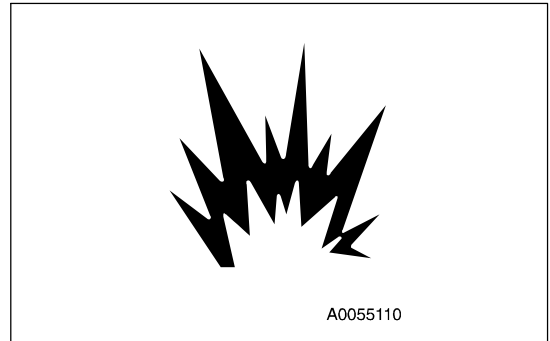
## REMOVE AND INSTALL BATTERY

1. Open the battery cover.
2. Before removing battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nuts of the terminal and remove the wires from the battery.
3. After installing the battery, fix it with the battery hold down.  
Tightening torque: 1.47 to 1.96 N·m (0.15 to 0.2 kgf·m, 1.1 to 1.4 lbft)
4. When installing the battery, connect the ground cable last.  
Insert the hole of the terminal on the battery and tighten the nut.  
Tightening torque: 11.8 to 19.6 N·m (1.2 to 2.0 kgf·m, 8.7 to 14.5 lbft)

### PRECAUTIONS FOR BATTERY CHARGING

If the battery is charged improperly, it may explode. Accordingly, charge it according to "IF BATTERY IS DISCHARGED (PAGE 3-128)" and the instruction manual attached to the charger, and observe the following items.

- Set the voltage of the charger to match the voltage of the battery to be charged. If the correct voltage is not selected, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to fix the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery capacity.  
If the charger current is too high, the electrolyte will leak or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a danger that this will ignite the battery electrolyte and cause the battery to explode.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.





## STARTING ENGINE WITH BOOSTER CABLE

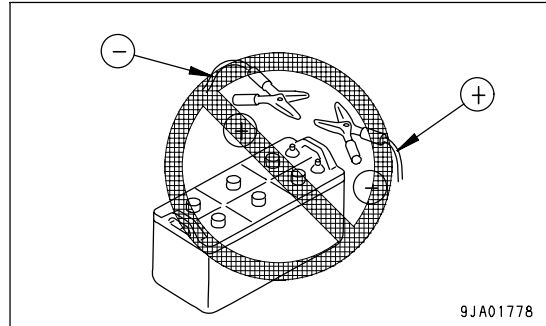
When starting the engine with a booster cable, do as follows:

### PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE



#### WARNING

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- When disconnecting the booster cable, take care not to bring the clips in contact with each other or with the machine body.



### NOTICE

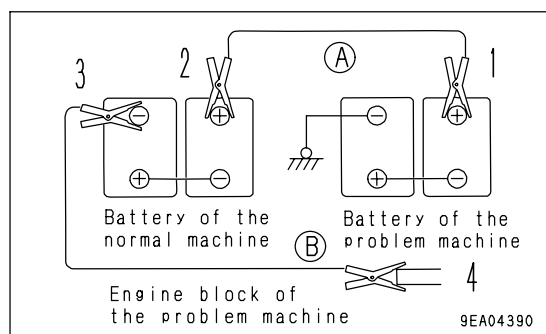
- The starting system for this machine uses 24V. For the normal machine, also use a 24V battery.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the work equipment lock levers and parking brake levers of both machine are in the LOCK position.
- Check that each lever is in the NEUTRAL position.

### CONNECTING THE BOOSTER CABLE

Keep the starting switch of the normal machine and problem machine in the OFF position.

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

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



## STARTING ENGINE

**WARNING**

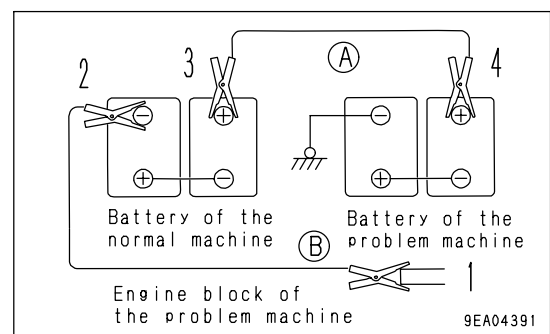
Always check that the work equipment lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are in the HOLD or NEUTRAL position.

1. Make sure the clips are firmly connected to the battery terminals.
  2. Start engine of the normal machine and run it at high idling speed.
  3. Turn the starting switch of the problem machine to the START position and start the engine.
- If the engine doesn't start at first, try again after 2 minutes or so.

**DISCONNECTING THE BOOSTER CABLE**

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

1. Remove 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 problem or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main cause	Remedy
Lamp does not glow brightly even when the engine runs at high speed	• Defective wiring	( • Check, repair loose terminals, disconnections Check fuses and diodes in fuse box)
Lamp flickers while engine is running	• Defective adjustment of fan belt tension	• Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Battery charge circuit caution lamp does not go out even when engine is running	• Defective belt • Defective alternator • Defective wiring	• Replace ( • Replace) ( • Check, repair Check fuse, diode in fuse box)
Abnormal noise is generated from alternator	• Defective alternator	( • Replace)
Starting motor does not turn when starting switch is turned to ON	• Defective wiring • Insufficient battery charge	( • Check, repair) • Charge
Pinion of starting motor keeps going in and out	• Insufficient battery charge	• Charge
Starting motor turns engine sluggishly	• Insufficient battery charge • Defective starting motor	• Charge ( • Replace)
Starting motor disengages before engine starts	• Defective wiring • Insufficient battery charge	( • Check, repair) • Charge
Engine preheating pilot lamp does not light up (When the temperature of the engine coolant exceed 20°C (68°F), this condition is normal)	• Defective wiring • Defective timer • Defective monitor • Disconnection in glow plug	( • Check, repair) ( • Replace) ( • Replace) ( • Replace)
Air conditioner operation is defective	• Blown fuse • Insufficient battery charge • Defective air conditioner switch • Defective blower switch • Defective compressor	( • Check, repair) • Charge ( • Replace air conditioner switch) ( • Replace blower switch) ( • Replace)

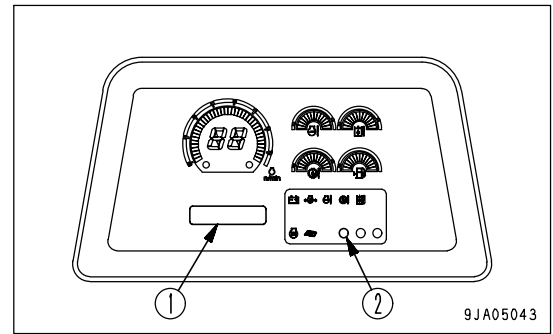
**MONITOR PANEL**

When an error code appears on the display panel B (multi-information), take appropriate remedies based upon the table below.

- (1): Display panel B
- (2): Warning lamp (red)

**REMARK**

If different kinds of failures occur at the same time, their failure codes are arranged in the order of seriousness in the display. The order of seriousness in this case is E04, E03, E02 and E01, starting from the most serious one.



Action code	Display panel B	Warning lamp	Alarm buzzer	Remedy
E01	Top line: Displays E01 Bottom line: Displays service meter	-	-	Failure in part of function, stops. When continuing operations, be extremely careful of location of failure. After completing operations, contact Komatsu distributor for repairs
E02	Top line: Displays E02 Bottom line: Displays service meter	Flashes	Sounds	Serious failure in part of function, stops. When continuing operations, be extremely careful of location of failure. After completing operations, contact Komatsu distributor for repairs
E03	Top line: Displays E03 Bottom line: Displays telephone number (If no telephone number is set, displays 0)	Flashes	Sounds	After moving to safe place, stop machine immediately. Contact Komatsu distributor for repairs
E04	Top line: Displays E04 Bottom line: Displays telephone number (If no telephone number is set, displays 0)	Flashes	Sounds	Stop machine immediately. Contact Komatsu distributor for repairs

Note: If an abnormality display appears on display panel B, check the fault code. For details, see "METHOD OF USING FAULT CODE DISPLAY MODE (PAGE 3-29)".

When contacting your Komatsu distributor, please give the fault code also.

**CHASSIS**

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

Problem	Main causes	Remedy
Oil pressure in torque converter fails to rise	<ul style="list-style-type: none"> <li>• Improper tightening of oil pipe, pipe joint, air leaking in or oil leaking out because of damage</li> <li>• Wear, scuffing of gear pump</li> <li>• Insufficient oil in power train case</li> <li>• Clogged oil filter element strainer in power train case</li> </ul>	<ul style="list-style-type: none"> <li>• Check, repair</li> <li>( • Check, replace)</li> <li>• Add oil to the specified level. For details, see CHECK BEFORE STARTING</li> <li>• Clean. For details, see EVERY 500 HOURS SERVICE</li> </ul>
Torque converter is overheats	<ul style="list-style-type: none"> <li>• Clogged radiator</li> <li>• Engine coolant temperature is high</li> <li>• Clogged oil cooler</li> <li>• Oil pressure too low</li> <li>• Lack of flow of lubricant caused by wear of power train gear pump</li> </ul>	<ul style="list-style-type: none"> <li>• Clean radiator core</li> <li>• See ENGINE related parts</li> <li>( • Clean or replace)</li> <li>• Go to "Oil pressure in torque converter fails to rise"</li> <li>( • Replace gear pump)</li> </ul>
Torque converter oil temperature gauge does not work	<ul style="list-style-type: none"> <li>• Defective oil temperature gauge</li> <li>• Defective contact in wiring connection</li> </ul>	<ul style="list-style-type: none"> <li>( • Replace oil temperature gauge)</li> <li>( • Check, repair)</li> </ul>
Lacks drawbar pull (machine does not pick up speed)	<ul style="list-style-type: none"> <li>• Lack of engine horsepower</li> <li>• Oil pressure in torque converter is too low</li> </ul>	<ul style="list-style-type: none"> <li>• See ENGINE related parts</li> <li>• Go to " Oil pressure in torque converter fails to rise"</li> </ul>
Machine will not move when joystick is placed in FORWARD	<ul style="list-style-type: none"> <li>• Insufficient oil in power train case</li> <li>• Transmission oil pressure does not rise</li> <li>• Defective Brake</li> <li>• Defective lever wiring</li> <li>• Parking brake lever is in LOCK position</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level. For details, see CHECK BEFORE STARTING</li> <li>• Go to oil pressure in torque converter fails to rise</li> <li>( • Adjust linkage)</li> <li>( • Check, repair)</li> <li>• Set to FREE position</li> </ul>
Does not steer even when steering is operated	<ul style="list-style-type: none"> <li>• Defective lever wiring</li> <li>• Abnormal HSS pump</li> <li>• Abnormal HSS motor</li> </ul>	<ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>( • Check, replace)</li> <li>( • Check, replace)</li> </ul>
Machine doesn't stop when brake pedal are depressed	<ul style="list-style-type: none"> <li>• Defective brake adjustment</li> </ul>	<ul style="list-style-type: none"> <li>( • Adjust linkage)</li> <li>( • Check brake pressure)</li> </ul>
Track comes off	<ul style="list-style-type: none"> <li>• Track is too loose</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust track tension. For details, see WHEN REQUIRED</li> </ul>
Sprocket develops abnormal wear	<ul style="list-style-type: none"> <li>• Track is too loose or too tight</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust track tension. For details, see WHEN REQUIRED</li> </ul>
Machine does not travel in straight line	<ul style="list-style-type: none"> <li>• Defective adjustment of HSS controller</li> <li>• Abnormal HSS pump</li> </ul>	<ul style="list-style-type: none"> <li>( • Adjust)</li> <li>( • Replace)</li> </ul>
Blade rises too slowly or does not rise at all (or blade tilts too slowly)	<ul style="list-style-type: none"> <li>• Lack of hydraulic oil</li> <li>• Defective hydraulic pump</li> <li>• Work equipment lock lever is in LOCK position</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level. For details, see EVERY 250 HOURS SERVICE</li> <li>• Check</li> <li>• Set to FREE position</li> </ul>

## ENGINE

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

Problem	Main causes	Remedy
Engine oil pressure monitor flashes when engine speed is raised after completion of warm-up	<ul style="list-style-type: none"> <li>• Engine oil pan oil level is low (sucking in air)</li> <li>• Clogged oil filter cartridge</li> <li>• Defective tightening of oil pipe joint, oil leakage from damaged part</li> <li>• Defective monitor panel</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level, see CHECK BEFORE STARTING</li> <li>• Replace cartridge, see EVERY 500 HOURS SERVICE</li> <li>( • Check, repair)</li> <li>( • Replace)</li> </ul>
Steam is emitted from top part of radiator (pressure valve)	<ul style="list-style-type: none"> <li>• Coolant level low, water leakage</li> <li>• Dirt or scale accumulated in cooling system</li> </ul>	<ul style="list-style-type: none"> <li>• Add coolant, repair, see CHECK BEFORE STARTING</li> <li>• Change coolant, clean inside of cooling system, see WHEN REQUIRED</li> </ul>
Engine water temperature monitor remains alight altitude operation)	<ul style="list-style-type: none"> <li>• Clogged radiator fins or damaged fins</li> <li>• Defective thermostat</li> <li>• Loose radiator filler cap (high altitude operation)</li> <li>• Defective monitor panel</li> </ul>	<ul style="list-style-type: none"> <li>• Clean or repair, see WHEN REQUIRED</li> <li>( • Replace thermostat)</li> <li>• Tighten cap or replace packing</li> <li>( • Replace)</li> </ul>
Engine does not start when starting motor is turned	<ul style="list-style-type: none"> <li>• Lack of fuel</li> <li>• Air in fuel system</li> <li>• No fuel in fuel filter</li> <li>• Starting motor cranks engine sluggishly</li> <li>• Defective valve compression</li> </ul>	<ul style="list-style-type: none"> <li>• Add fuel, see CHECK BEFORE STARTING</li> <li>• Repair place where air is sucked in</li> <li>( • Replace pump or nozzle)</li> <li>• See ELECTRICAL SYSTEM</li> <li>( • Adjust valve clearance)</li> </ul>
Exhaust gas is white or blue	<ul style="list-style-type: none"> <li>• Too much oil in oil pan</li> <li>• Improper fuel</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level, see CHECK BEFORE STARTING</li> <li>• Change to specified fuel</li> </ul>
Exhaust gas occasionally turns black	<ul style="list-style-type: none"> <li>• Clogged air cleaner element</li> <li>• Defective nozzle</li> <li>• Defective compression</li> <li>• Defective turbocharger</li> </ul>	<ul style="list-style-type: none"> <li>• Clean or replace, see WHEN REQUIRED</li> <li>( • Replace nozzle)</li> <li>( • Adjust valve clearance)</li> <li>( • Clean or replace, turbocharger)</li> </ul>
Combustion noise occasionally makes breathing sound	<ul style="list-style-type: none"> <li>• Defective nozzle</li> <li>• Lack of fuel (in Air)</li> </ul>	<ul style="list-style-type: none"> <li>( • Replace nozzle)</li> <li>• Add fuel</li> </ul>
Abnormal noise generated (combustion or mechanical)	<ul style="list-style-type: none"> <li>• Low grade fuel being used</li> <li>• Overheating</li> <li>• Damage inside muffler</li> <li>• Excessive valve clearance</li> </ul>	<ul style="list-style-type: none"> <li>• Change to specified fuel</li> <li>• See item "Indicator of water temperature gauge is in red range on right side of gauge".</li> <li>( • Replace muffler)</li> <li>( • Adjust valve clearance)</li> </ul>
Monitor displays error code	Please contact your Komatsu distributor	
Alarm buzzer sounds		
Engine horsepower lowered suddenly (Engine is running in duration mode)		



# MAINTENANCE

 **WARNING**

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

---



## GUIDE TO MAINTENANCE

Do not perform any inspection and maintenance operation that is not found in this manual.

### CHECK SERVICE METER:

Check the service meter reading every day to see if the time has come for any necessary maintenance to be performed.

### KOMATSU GENUINE REPLACEMENT PARTS:

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

### KOMATSU GENUINE OILS:

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

### ALWAYS USE CLEAN WASHER FLUID:

Use automobile window washer fluid, and be careful not to let any dirt get into it.

### CLEAN OIL AND GREASE:

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

### CHECKING FOREIGN MATERIALS IN DRAINED OIL:

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

### FUEL STRAINER:

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 200 V continuously.
- Connect grounding cable within 1 m (3.3 ft) of the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may malfunction.
- If a seal or bearing happens to come between the part being welded and grounding point, change the grounding point to avoid such parts.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

### DO NOT DROP THINGS INSIDE MACHINE:

- When opening inspection windows or the oil filler port of the tank to carry out inspection, be careful not to drop nuts, bolts, or tools inside the machine.  
If such things are dropped inside the machine, it may cause damage and/or malfunction of the machine, and will lead to failure. If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

### DUSTY WORKSITES:

When working at dusty worksites, do as follows:

- Inspect the dust indicator frequently to see if the air cleaner is dirty or clogged.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.

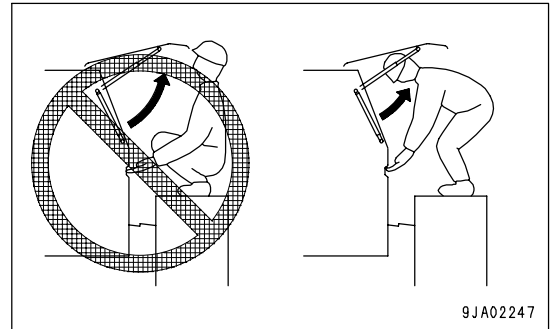
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

**AVOID MIXING OILS:**

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

**PRECAUTIONS FOR OPENING AND CLOSING ENGINE SIDE COVER:**

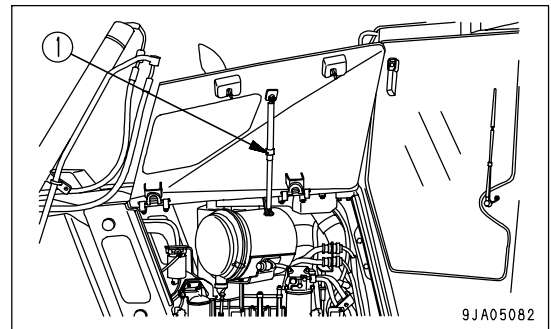
- Open the engine side cover all the way and ensure that it is locked open before letting go.
- When standing on the track to open the engine side cover, bend at the knees and open the cover in a standing position to avoid back strain.



- Before opening the cab door, always close the engine side cover.

If the lock for the engine side cover is not released, it will not close. If any attempt is made to close it without releasing the lock, the gas damper may break.

When closing the cover, push the orange button in the center of the gas damper (1) to release the lock, then close the cover.



**LOCKING THE INSPECTION COVER:**

Lock inspection cover securely into position with the lock bar. If inspection or maintenance is performed with inspection cover not locked in position, there is a danger that it may be suddenly blown shut by the wind and cause injury to the worker.

**HYDRAULIC SYSTEM-AIR BLEEDING:**

After repairing or replacing hydraulic equipment or after removing the hydraulic piping, it is necessary to bleed the air from the circuit. For details, see "PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (PAGE 4-39)".

**PRECAUTIONS WHEN INSTALLING HYDRAULIC HOSES:**

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.  
When doing this, be careful not to forget to assemble the O-rings and gaskets.
- When installing the hoses, do not twist or bend them into loops with a small radius.  
This will cause damage to the hose and drastically reduce its service life.

**CHECKS AFTER INSPECTION AND MAINTENANCE WORK:**

If you forget to perform the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do the following:

- Checks after operation (with engine stopped)
  - Have any inspection and maintenance points been forgotten?
  - Have all inspection and maintenance items been performed correctly?
  - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
  - Is there any leakage of coolant or oil? Have all nuts and bolts been tightened?
- Checks when engine is running
  - For the checks when the engine is running, see "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (PAGE 2-27)" 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.

**FUEL AND LUBRICANTS TO MATCH THE AMBIENT TEMPERATURE:**

Select the fuel and lubricants to match the ambient temperature.

For details, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-11)".

## OUTLINE OF SERVICE

- Always use Komatsu genuine parts for replacement parts, grease or oil.
- When changing the oil or adding oil, do not mix different types of oil. When changing the type of oil, drain all the old oil and fill completely with the new oil. Always replace the filter at the same time. (There is no problem if the small amount of oil remaining in the piping mixes with the new oil.)
- Unless otherwise specified, when the machine is shipped from the factory, it is filled with the oil and coolant listed in the table below.

Item	Type
Engine oil pan	Engine oil EO15W40DH (Komatsu genuine parts)
Power train case Final drive case Damper case Idler (each)	Power train oil TO30 (Komatsu genuine parts)
Hydraulic system	Power train oil TO10 (Komatsu genuine parts)
Radiator	Supercoolant AF-NAC (Density: 30% or above) (Komatsu genuine parts)

## HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

### OIL

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure), and deteriorates with use.  
Always use oil that matches the grade and maximum and minimum ambient temperatures recommended in the Operation and Maintenance Manual. Even if the oil is not dirty, always change the oil after the specified interval.
- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.  
The majority of problems with the 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 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.
- When using commercially available oil, it may be necessary to reduce the oil change interval.  
We recommend that you use the Komatsu oil clinic to carry out a detailed checks of the characteristics of the oil.

### FUEL

- 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.
- 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 temperatures below -15°C (5°F)), so it is necessary to use the fuel that is suitable for the temperature.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

- If there is any foreign material in the fuel tank, wash the tank and fuel system.

## COOLANT AND WATER FOR DILUTION

- The coolant has the important function of preventing corrosion as well as preventing freezing. Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential. Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.
- When diluting the antifreeze coolant, use distilled water or tap water (soft water). Natural water, such as a river water or well water (hard water), contains large amounts of minerals (calcium, magnesium, etc.), and this makes it easier for scale to form inside the engine or radiator. Once scale is deposited inside the engine or radiator, it is extremely difficult to remove. It also causes overheating due to poor heat exchange, so when you dilute the coolant, we recommend that you use water with an overall hardness of less than 100 PPM.
- When using antifreeze, always observe the precautions given in the Operation and Maintenance Manual.
- Antifreeze coolant is flammable, so be sure to keep it away from flame.
- The ratio of Supercoolant (AF-NAC) to water differs according to the ambient temperature. For details of the ratio when mixing, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-23)". Supercoolant (AF-NAC) may be supplied already mixed. In such cases, never dilute with water.
- 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 due to air entering the coolant.

## GREASE

- Grease is used to prevent seizure and noises at the joints.
- This construction equipment is used under heavy-duty conditions. Always use the recommended grease and follow the change intervals and recommended ambient temperatures given in this Operation and Maintenance Manual.
- 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.

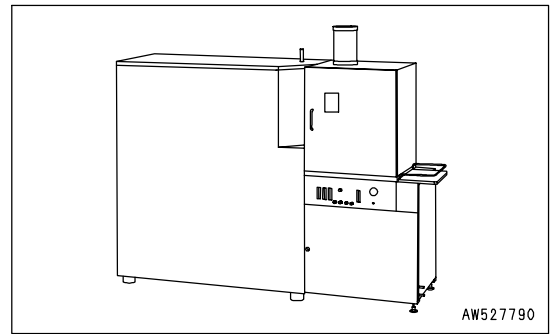
## CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

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

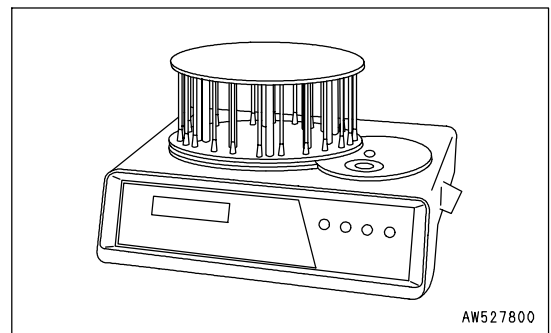
We strongly recommend you to use this service. The oil analysis is carried out at actual cost, so the cost is low, and the results of the analysis are reported together with recommendations which will reduce repair costs and machine downtime.

**KOWA ANALYSIS ITEMS**

- Measurement of density of metal wear particles  
 This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of iron, copper, and other metal wear particles in the oil.



- Measurement of quantity of particles  
 This uses a particle quantifier index measurement machine to measure the quantity of iron particles of 5μ or more, enabling early detection of failures.



- Others  
 Measurements are made of items such as the ratio of water in the oil, density of the antifreeze coolant, ratio of fuel in the oil, and dynamic viscosity, enabling a highly precise diagnosis of the machine's health.

**OIL SAMPLING**

- Sampling interval  
 250 hours: Engine  
 500 hours: Other components
- Precautions when sampling
  - Make sure that the oil is well mixed before sampling.
  - Perform sampling at regular fixed intervals.
  - Do not perform sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

**STORING OIL AND FUEL**

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drums is at the side to prevent moisture from being sucked in.  
 If drums have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

**FILTERS**

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.  
 Replace all filters periodically. For details, see the Operation and Maintenance Manual.  
 However, when working in severe conditions, replace the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.

- When replacing oil filters, check if any metal particles are affixed to the old filter. If any metal particles are found, contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

## **RELATING TO ELECTRIC SYSTEM**

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause an electrical short circuit and may lead to malfunction of the machine. Do not wash the inside of the operator's cab with water. When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system is checking fan belt tension, checking damage or wear to the fan belt and checking battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electro-magnetic interference may cause malfunction of the control system controller, so before installing a radio receiver or other wireless equipment, contact your Komatsu distributor.
- Be careful to keep the electric system free of water when washing the machine or when it rains.
- 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.

## WEAR PARTS LIST

Replace wear parts such as the filter element or air cleaner element at the time of periodic maintenance or before they reach the wear limit. The wear parts should be replaced correctly in order to ensure more economic use of the machine. When replacing parts, always use Komatsu genuine parts.

As a result of our continuous efforts to improve product quality, the part number may change, so inform your Komatsu distributor of the machine serial number and check for the latest part number when ordering parts.

### WEAR PARTS LIST

The parts in parentheses are to be replaced at the same time.

Item	Part No.	Part Name	Weight (kg(lb))	Q'ty	Replacement frequency	
Fuel filter	600-311-3310	Cartridge	–	1	Every 500 hours service	
Engine oil filter	600-211-1340	Cartridge	–	1		
Power train filter	14X-49-32750 (07000-72110)	Element (O-ring)	– –	1 (1)		
Corrosion resistor	600-411-1151	Cartridge	–	1	Every 1000 hours service	
Hydraulic oil filter	14X-60-31150 (07000-15195)	Element (O-ring)	– –	1 (1)	Every 2000 hours service	
Hydraulic tank breather element	20Y-60-21470	Element	–	1		
Air cleaner	600-185-5100	Element Ass'y	–	1	–	
Air conditioner	Fresh filter	14X-911-7750	Filter	–	2	–
	Recirc filter	20Y-979-6261	Filter	–	2	
Blade	D65EX Tiltdozer	14X-71-11310	Cutting edge	38.4	2	–
		14X-71-11330	End bit (left)	14.2	1	
		14X-71-11340	End bit (right)	14.2	1	
		(02090-11270)	(Bolt)	–	(28)	
		(02290-11219)	(Nut)	–	(28)	
	D65PX Tilt pitch dozer	14Y-71-11210	Cutting edge	45.5	2	–
		14Y-71-11330	End bit (left)	13.6	1	
		14Y-71-11340	End bit (right)	13.6	1	
		(02090-11270)	(Bolt)	–	(32)	
		(02290-11219)	(Nut)	–	(32)	
	D65EX Angle dozer	144-70-11131	Cutting edge	45.5	2	–
		14X-71-11330	End bit (left)	14.2	1	
		14X-71-11340	End bit (right)	14.2	1	
		(02090-11270)	(Bolt)	–	(32)	
		(02290-11219)	(Nut)	–	(32)	
	D65PX Angle dozer	130-70-51130	Cutting edge (center)	39.0	1	–
130-920-2180		Cutting edge (side)	34.0	2		
13F-Z27-1581		End bit (left)	10.8	1		
13F-Z27-1571		End bit (right)	10.8	1		
(02090-11270)		(Bolt)	–	(31)		
(02090-11210)		(Bolt)	–	(4)		
(02290-11219)		(Nut)	–	(35)		



Item	Part No.	Part Name	Weight (kg(lb))	Q'ty	Replacement frequency	
Blade	D65EX Semi-U blade (tilt dozer)	130-70-41130	Cutting edge	37.5	1	-
		130-920-2180	Cutting edge	34.0	1	
		(02090-11270)	(Bolt)	-	(17)	
		(02290-11219)	(Nut)	-	(17)	
		175-71-22272	End bit (left)	39.0	1	
		175-71-22282	End bit (right)	39.0	1	
		(02090-11495)	(Bolt)	-	(14)	
		(02290-11422)	(Nut)	-	(14)	
	D65EX Semi-U blade (3m) (tilt dozer)	14X-952-1270	Cutting edge	29.8	2	-
		(02090-11270)	(Bolt)	-	(14)	
		(02290-11219)	(Nut)	-	(14)	
		150-70-21356	End bit (left)	26.2	1	
		150-70-21346	End bit (right)	26.2	1	
		(02090-11280)	(Bolt)	-	(12)	
		(02290-11219)	(Nut)	-	(12)	
		D65WX Semi-U blade (tilt dozer)	14X-952-1450	Cutting edge	32.0	
	(02090-11270)		(Bolt)	-	(18)	
	(02290-11219)		(Nut)	-	(18)	
	175-71-22272		End bit (left)	39.0	1	
	175-71-22282		End bit (right)	39.0	1	
	(02090-11495)		(Bolt)	-	(14)	
	(02290-11422)		(Nut)	-	(14)	
	(01643-22245)		(Washer)	-	(14)	

**NOTICE**

When handling parts that weigh more than 25 kg (55 lb), remember that they are heavy objects, and take the necessary care.

## RECOMMENDED FUEL, COOLANT, AND LUBRICANT

- Komatsu genuine oils are adjusted to maintain the reliability and durability of Komatsu construction equipment and components.

In order to keep your machine in the best conditioner for long periods of time, it is essential to follow the instructions in this Operation and Maintenance Manual.

- Failure to follow these recommendations may result in shortened life or excess wear of the engine, power train, cooling system, and/or other components.
- Commercially available lubricant additives may be good for the machine, but they may also cause harm. Komatsu does not recommend any commercially available lubricant additive.
- Use the oil recommended according to the ambient temperature in the chart below.
- Specified capacity means the total amount of oil including the oil in the tank and the piping. Refill capacity means the amount of oil needed to refill the system during inspection and maintenance.
- When starting the engine in temperatures below 0°C (32°F), be sure to use the recommended multi-grade oil, even if the ambient temperature may become higher during the course of the day.
- If the machine is operated at a temperature below -20°C (-4°F), a separate device is needed, so consult your Komatsu distributor.
- When the fuel sulfur content is less than 0.5%, change the engine oil according to the period inspection table given in this Operation and Maintenance Manual.

If the fuel sulfur content is more than 0.5%, change the oil according to the following table.

Fuel sulfur content	Engine oil change interval
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

Reservoir	Fluid Type	Ambient Temperature, degrees Celsius									Recommended Komatsu Fluids	
		-22	-4	14	32	50	68	86	104	122 °F		
		-30	-20	-10	0	10	20	30	40	50 °C		
Engine oil pan	Engine oil	SAE0W30EOS and HTHS 3.5min. (Note.1)										Komatsu EOS0W30
		SAE5W40EOS and HTHS 3.5min. (Note.1)										Komatsu EOS5W40
		SAE10W30DH										Komatsu EO10W30DH
		SAE15W40DH										Komatsu EO15W40DH
		SAE30DH										Komatsu EO30DH
Damper case Idler (each)	Power train oil (Note.2)	TO30									TO30	
Power train case	Power train oil	TO10										TO10
					TO30						TO30	
Final drive case (each)	Power train oil	TO30									TO30	
Hydraulic system	Power train oil	TO10										TO10
	Hydraulic oil	HO46-HM										HO46-HM
	Engine oil	SAE10W30DH										Komatsu EO10W30DH
SAE15W40DH										Komatsu EO15W40DH		
Grease fitting	Hyper grease (Note.3)	G2-T, G2-TE										G2-T, G2-TE
	Lithium EP grease	G2-LI										G2-LI
Cooling system	Supercoolant AF-NAC	AF-NAC (Note.4)									AF-NAC	
Fuel tank	Diesel fuel	No.2-D										ASTM No.2-D
		No.1-D										ASTM No.1-D

		Engine oil pan	Damper case	Idler (each)	Hydraulic system	Power train case	Final drive case (each)		Fuel tank	Cooling system (including sub-tank)
							EX	PX,WX		
Specified capacity	Liters	44	1.7	0.15	95	68	24	27	415	58
	US gal	11.62	0.45	0.04	25.10	17.97	6.34	7.13	109.64	15.32
Refill capacity	Liters	38	1.7	0.15	55	48	24	27	–	–
	US gal	10.04	0.45	0.04	14.53	12.68	6.34	7.13	–	–

**NOTICE**

**Use only diesel fuel.**

The engine mounted on this machine employs electronic control and a high-pressure fuel injection device to obtain good fuel consumption and good exhaust gas characteristics. For this reason, it requires high precision for the parts and good lubrication. If kerosene or other fuel with low lubricating ability is used, there will be a big drop in durability.

Note 1: SAE0W30EOS and SAE5W40EOS must be fully synthetic and HTHS ( High-Temperature High-Shear Viscosity 150°C) must be equal to or higher than 3.5 cP. Komatsu EOS0W30 and EOS5W40 are the most suitable oils. If these oils are not available, follow the instruction "RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN KOMATSU GENUINE OIL (PAGE 4-13)" at the end of this chapter.

Note 2: Powertrain oil has different properties from engine oil. Be sure to use the recommended oils.

Note 3: Hyper grease (G2-T, G2-TE) has a high performance.

When it is necessary to improve the lubricating ability of the grease in order to prevent squeaking of pins and bushings, the use of G2-T or G2-TE is recommended.

Note 4: Supercoolant (AF-NAC)

1) Coolant has the important function of anticorrosion as well as antifreeze.

Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.

Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.

2) For details of the ratio when diluting super coolant with water, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-23)".

When the machine is shipped from the factory, it may be filled with coolant containing 30% or more Supercoolant (AF-NAC). In this case, no adjustment is needed for temperatures down to -10°C (14°F). (never dilute with water)

3) To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

**RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN KOMATSU GENUINE OIL**

When using commercially available oils other than Komatsu genuine oil, or when checking the latest specifications, refer to the Komatsu web page or consult your Komatsu distributor.

# STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

## TORQUE LIST

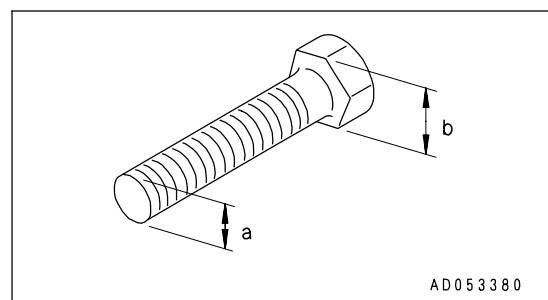


If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation.

Always pay careful attention when tightening parts.

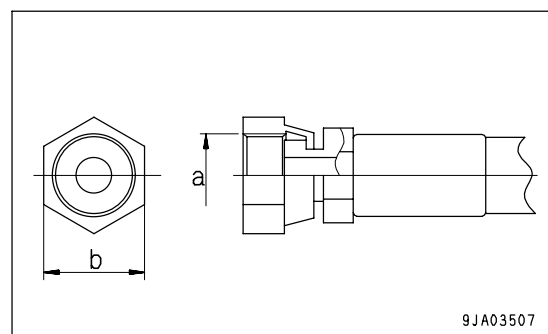
Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
6	10	13.2	1.35	9.8	11.8-14.7	1.2-1.5	8.7-10.8
8	13	31	3.2	23.1	27-34	2.8-3.5	20.3-25.3
10	17	66	6.7	48.5	59-74	6.0-7.5	43.4-54.2
12	19	113	11.5	83.2	98-123	10.0-12.5	72.3-90.4
14	22	172	17.5	126.6	153-190	15.5-19.5	112.1-141
16	24	260	26.5	191.7	235-285	23.5-29.5	170.0-213.4
18	27	360	37	267.6	320-400	33.0-41.0	238.7-296.6
20	30	510	52.3	378.3	455-565	46.5-58.0	336.3-419.5
22	32	688	70.3	508.5	610-765	62.5-78.0	452.1-564.2
24	36	883	90	651	785-980	80.0-100.0	578.6-723.3
27	41	1295	132.5	958.4	1150-1440	118.0-147.0	853.5-1063.3
30	46	1720	175.0	1265.8	1520-1910	155.0-195.0	1121.1-1410.4
33	50	2210	225.0	1627.4	1960-2450	200.0-250.0	1446.6-1808.3
36	55	2750	280.0	2025.2	2450-3040	250.0-310.0	1808.3-2242.2
39	60	3280	335.0	2423.1	2890-3630	295.0-370.0	2133.7-2676.2



Apply the following table for Hydraulic Hose.

Nominal - No. of threads (a)	Width across flats (b) (mm)	Tightening torque					
		Target value			Permissible range		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
9/16 -18UNF	19	44	4.5	32.5	35 - 63	3.5 - 6.5	25.3 - 47.0
11/16 -16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16 -16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1 -14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
13/16 -12UN	36	216	22.0	159.1	177 - 245	18.0 - 25.0	130.2 - 180.8



## PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

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.

Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence, it is required to replace them with new ones regardless of their condition after a certain period of usage. This is important to ensure that these parts maintain their full performance at all times.

Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived.

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

Also perform the following checks with hydraulic hoses which need to be replaced periodically. Tighten all loose clamps and replace defective hoses, as required.

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

Have your Komatsu distributor replace the critical parts.

### SAFETY CRITICAL PARTS

NO.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - injection pump)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (injection pump - fuel filter)	2	
3	Fuel return hose (injection pump - fuel tank)	1	
4	Fuel return hose (injection nozzle - fuel tank)	1	
5	Hose (power train strainer - power train pump)	1	
6	Hose (power train pump - power train filter)	1	
7	Hose (power train filter - transmission case)	1	
8	Hose (transmission case - steering case)	1	
9	Hose (power train lubrication pump - steering case)	1	
10	Hose (Scavenging pump - Steering case)	1	
11	Hose (torque converter case - mission oil cooler)	1	
12	Hose (mission oil cooler - transmission case)	1	
13	Brake pressure detection hose	1	
14	Torque converter inlet post pressure detection hose	1	
15	Torque converter outlet post pressure detection hose	1	
16	Main relief valve pressure detection hose	1	
17	Hose (HSS pump - main control valve)	2	
18	Hose (HSS pump - central drain block)	1	
19	Hose (self-reducing pressure valve - hydraulic tank)	1	
20	Hose (main valve - HSS motor)	2	
21	Hose (main valve - hydraulic tank)	1	

NO.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
22	Hose (main valve - central drain block)	1	Every 2 years or 4000 hours, whichever comes sooner
23	Hose (main control valve - blade tilt relay block)	2	
24	Hose (blade tilt relay block - Tilt cylinder)	8	
25	Hose (main valve - blade tilt relay tube)	2	
26	Hose (Radiator guard upper part - Lift cylinder)	4	
27	Hose (self-reducing pressure valve - fan pump)	1	
28	Hose (hydraulic tank - fan pump)	1	
29	Hose (self-reducing pressure valve - fan motor)	1	
30	Hose (fan motor - hydraulic oil cooler)	1	
31	Hose (hydraulic tank - fan motor)	1	
32	Hose (hydraulic oil cooler - hydraulic tank)	1	
33	Hose (central drain block - HSS motor)	1	
34	Hose (PPC valve - main valve)	4	
35	Hose (central PPC block - main valve)	2	
36	Hose (fan pump - central PPC block)	1	
37	Hose (PPC lock valve - central PPC block)	1	
38	Hose (self-reducing pressure valve - central PPC block)	1	
39	Hose (PPC valve - PPC lock valve)	1	
40	Hose (PPC valve - central drain block)	1	
41	Hose (central drain block - hydraulic tank)	1	
42	Hose (HSS delivery hose - pressure detection block)	1	
43	Hose (HSS pump - pressure detection block)	1	
44	Injector assembly (A regulation area)	1	
45	Injector nozzle chip (B regulation area)	1S	
46	High-pressure tube clamp	1S	
47	Fuel spray prevention cap	1S	
48	Seat belt (If equipped)	1	Every 3 years

# MAINTENANCE SCHEDULE CHART

## MAINTENANCE SCHEDULE CHART

The maintenance interval for adjusting the injector differs according to the exhaust gas regulations for each area. When carrying out the adjustment, check the maintenance time. For details, see "ADJUST INJECTOR (PAGE 4-19)".

### WHEN REQUIRED

CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT .....	4- 20
CLEAN INSIDE OF COOLING SYSTEM .....	4- 23
CHECK TRACK TENSION .....	4- 26
CHECK AND TIGHTEN TRACK SHOE BOLTS .....	4- 28
CHECK ELECTRICAL INTAKE AIR HEATER .....	4- 28
REVERSE AND REPLACE END BITS AND CUTTING EDGES .....	4- 29
CLEAN, CHECK RADIATOR FINS .....	4- 31
CHECK, ADJUST AIR CONDITIONER .....	4- 33
GREASE DOOR HINGE .....	4- 34
CHECK DOOR LOCK STRIKER .....	4- 34
REPLACE DOOR DAMPER .....	4- 34
CHECK DOOR LATCH .....	4- 35
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID .....	4- 35
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## ADJUST INJECTOR

This machine uses an engine that conforms with all exhaust gas regulations.

The exhaust gas regulations differ according to the applicable area. To ensure that the engine conforms with the regulations in the area of use and can fully display its performance, keep to the following periodic maintenance intervals when adjusting the injector.

If the periodic maintenance intervals are not observed correctly, the engine may not be able to display its performance fully, and it may also not conform with the regulations.

### NOTICE

**When transporting a machine from an A regulation area to a B regulation area, always replace all the injector assemblies before transporting the machine to the new area.**

**Check with your Komatsu distributor to confirm if your area of operation is an A regulation area or a B regulation area.**

## A REGULATION AREA

EPA regulation areas and areas with the regulations equivalent to EPA regulations

### EVERY 2000 HOURS SERVICE

#### Check injector

Check the exhaust gas color visually. If there is any abnormality in the exhaust gas color, please ask your Komatsu distributor to carry out inspection or replacement. For details of the procedure if any abnormality is found, see Section "ENGINE (PAGE 3-135)".

### EVERY 4000 HOURS SERVICE

#### Replace injector assembly

Ask your Komatsu distributor to carry out this work.

## B REGULATION AREA

Areas not applying EPA regulations or areas not applying regulations equivalent to EPA regulations

### EVERY 4000 HOURS SERVICE

#### Check injector

Check the exhaust gas color visually. If there is any abnormality in the exhaust gas color, please ask your Komatsu distributor to carry out inspection or replacement. For details of the procedure if any abnormality is found, see Section "ENGINE (PAGE 3-135)".

### EVERY 8000 HOURS SERVICE

#### Replace injector nozzle tip

Ask your Komatsu distributor to carry out this work.

# SERVICE PROCEDURE

## WHEN REQUIRED

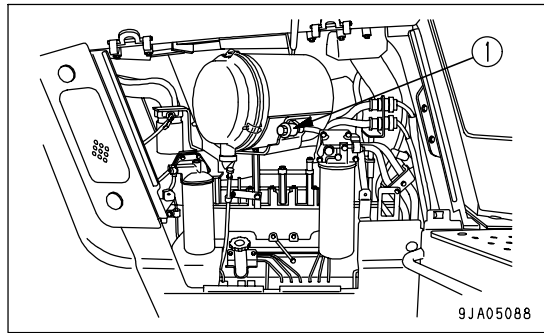
### CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

**! WARNING**

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

#### CHECKING

If the yellow piston at the display portion of dust indicator (1) becomes red (7.5 kPa), clean the outer element.



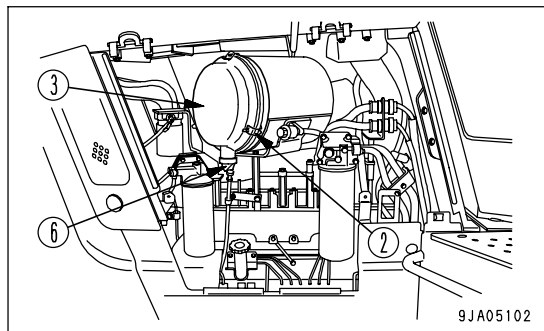
#### NOTICE

Do not clean the filter element until after a yellow piston in the dust indicator display has come in the red area (7.5 kPa).

If the filter element is cleaned frequently before the yellow piston in the dust indicator display comes in the red area (7.5 kPa), the air cleaner cannot exert its inherent cleaning capability, reducing its cleaning effect. In addition, dust sticking to the element falls into the inner element each time the element is cleaned.

#### CLEANING OR REPLACING OUTER ELEMENT

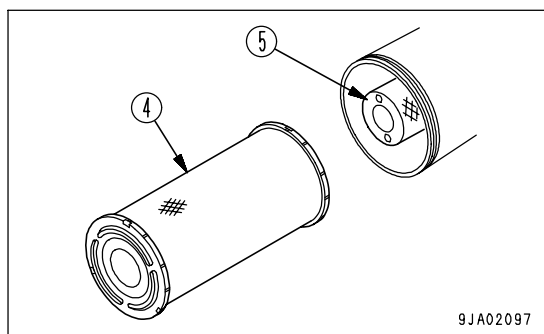
1. Open the left engine side cover.
2. Remove three clips (2), then remove cover (3).



#### NOTICE

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

3. Remove outer element (4).



4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).

**NOTICE**

The inner element must not be used again even after cleaning. When replacing the outer element, replace the inner element at the same time.

5. Direct dry compressed air (Max. 0.69 MPa (7 kgf/cm<sup>2</sup>, 99.4 PSI)) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.

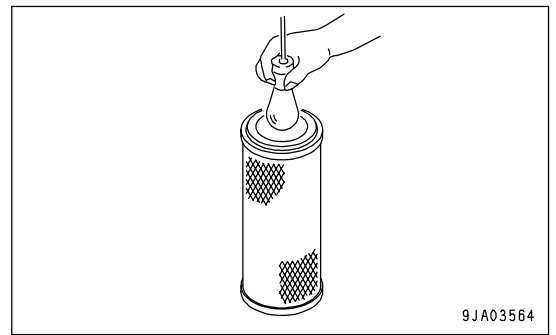
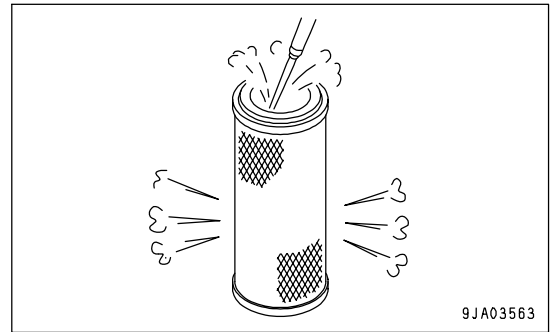
- 1) Replace any outer element which has been cleaned 6 times or used for one year. Replace the inner element at the same time.

- 2) Even if the outer element has not been cleaned 6 times, if the yellow piston in the dust indicator goes to the 5 kPa position immediately after cleaning (when the engine is running at high idling, replace both the inner and the outer element.

6. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.

**NOTICE**

When cleaning the element, do not hit or beat it against anything. Do not use an element whose folds, gasket or seal are damaged.

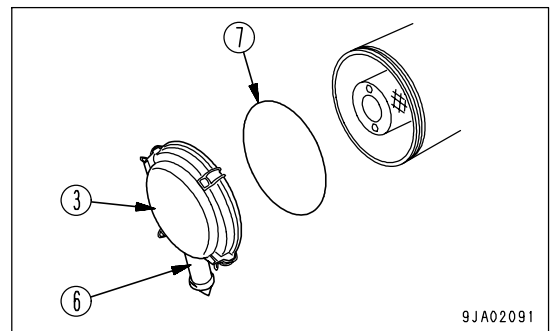


7. Before installing the outer element, check that the inner element is fitted securely. If the inner element is not fitted securely, push it in properly.

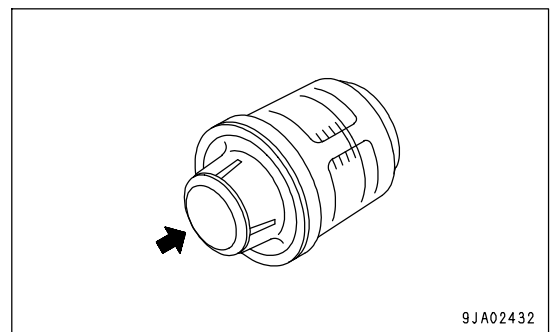
**CAUTION**

When installing the cover (3), check O-ring (7) and replace it if there are any scratches or damage.

8. Set the cleaned outer element in position, then secure cover (3) with mounting clips (2).



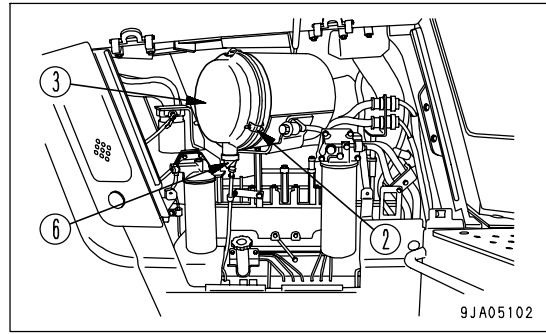
9. Push the button of dust indicator (1) and return the yellow piston to its original position.



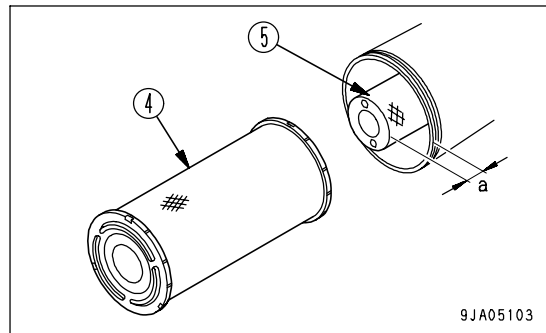
10. Close the left engine side cover.

**REPLACING ELEMENT**

1. Open the left engine side cover.
2. Remove three clips (2), then remove cover (3).



3. Remove outer element (4).  
Do not remove inner element (5) at this time, however.
4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).

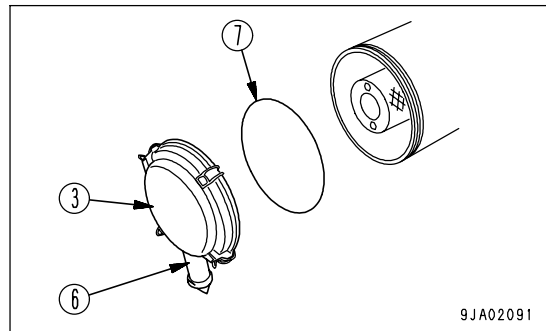


**NOTICE**

If the outer element and cover are installed when the inner element is not installed properly, the outer element may break.

When installation is correct, protrusion "a" of the inner element from the air cleaner body is 35 mm.

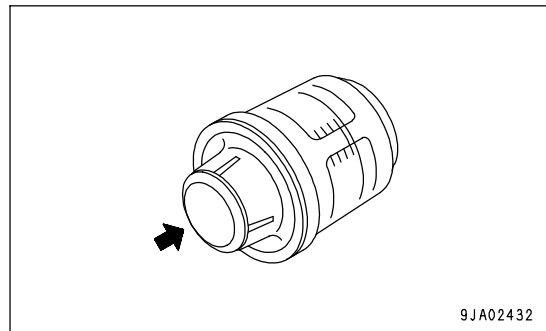
5. Remove inner element (5), then quickly install the new inner element.  
Push the inner element in properly and check that it is fitted securely.
6. Set the new outer element (4) in position.
7. Replace O-ring (7) for cover (3) with new one.
8. Set the arrow mark on cover (3) at the top, install to the air cleaner body, then secure with clip (2).



9. Push the button of dust indicator (1) and return the yellow piston to its original position.

**REMARK**

Immediately after a new element has been installed, the yellow piston of the dust indicator may go to the 2nd position, but this does not indicate any abnormality.



10. Close the left engine side cover.

**CLEAN INSIDE OF COOLING SYSTEM**



**WARNING**

- Just after the engine is stopped, the coolant is still hot and the internal pressure in the radiator is still high. If the radiator cap is removed under this condition, you may scald yourself. Accordingly, wait until the temperature goes down, then loosen the cap slowly to release the pressure.
- Start the engine to clean the cooling system. When standing up from the operator's seat or leaving the machine, set the work equipment lock lever and parking brake lock lever to the LOCK positions.
- For the starting method of the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (PAGE 3-66)" and "STARTING ENGINE (PAGE 3-82)" in the OPERATION section of the manual.
- Never go under the machine body while the engine is running. It is very dangerous since the machine may move suddenly.

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

Antifreeze coolant	Interval of cleaning inside of cooling system and changing antifreeze coolant	Replacing corrosion resistor
Komatsu supercoolant (AF-NAC)	Every two years or every 4000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant.
Permanent type antifreeze (All-season type, *)	Every year (autumn) or every 2000 hours whichever comes first.	

\*: Permanent type antifreeze shall meet the requirements of ASTM D3306-03.

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

The coolant has the important function of preventing corrosion as well as preventing freezing.

Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.

Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.

To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing table given below.

It is actually better to estimate and temperature about 10°C (18°F) lower when deciding the mixing ratio.

The mixing ratio depends on the ambient temperature, but it should always be a minimum of 30% by volume (antifreeze/total amount of coolant x 100).

The freezing temperature of undiluted antifreeze is -15°C (5°F). Do not store undiluted antifreeze at a temperature of below -15°C (5°F).

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	Above -10	-15	-20	-25	-30
	°F	Above 14	5	-4	-13	-22
Amount of antifreeze	Liters	17.4	20.9	23.8	26.7	29.0
	US gal	4.60	5.52	6.29	7.05	7.66
Amount of water	Liters	40.6	37.1	34.2	31.3	29.0
	US gal	10.72	9.80	9.04	8.27	7.66
Ratio	%	30	36	41	46	50



## WARNING

Antifreeze is flammable, so keep it away from flame.

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

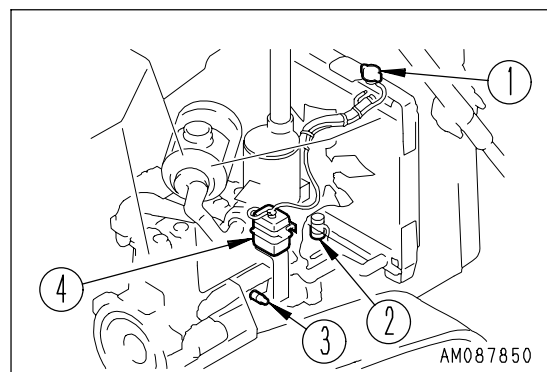
Use antifreeze and appropriate water for diluting (for details, see "COOLANT AND WATER FOR DILUTION (PAGE 4-6)")

We recommend use of an antifreeze density gauge to control the mixing proportions.

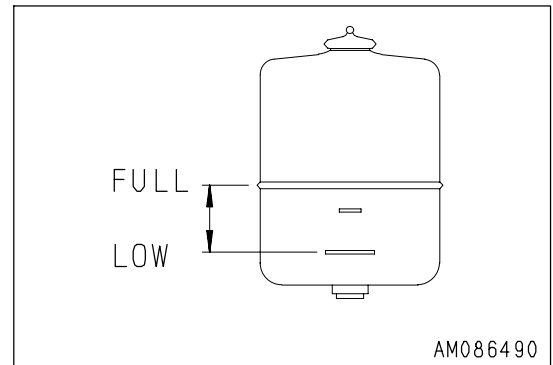
Prepare a container whose capacity is larger than the specified coolant volume to catch drained coolant.

Prepare a hose to supply antifreeze coolant and water.

1. Stop the engine and tighten 2 valves of the corrosion resistor.
2. Turn radiator cap (1) slowly until it hits the stopper and by so doing, relieving the internal pressure.
3. Turn radiator cap (1) until it hits the next stopper, while depressing it. Keep turning the radiator cap (1) until it hits the last stopper.
4. Place a container to receive the antifreeze solution under drain valve (2) on the underside of the radiator and drain valve (3) on the side of the cylinder block.  
Open drain valve (2) and remove drain valve (3) to drain the antifreeze solution.
5. After draining the antifreeze solution, close drain valve (2), (3), then fill with clean water. After the radiator is filled with water, start and run the engine at low idling speed. After the water temperature rises above 90°C (194°F), run the engine for about 10 minutes.
6. Stop the engine and open drain valve (2), (3) to drain the water.
7. After draining the water, clean the cooling system with cleaning agent.  
For the cleaning method, see the instructions for the cleaning agent.



8. Replace the corrosion resistor, then open 2 valves.  
For details of the procedure for replacing the corrosion resistor, see "REPLACE CORROSION RESISTOR CARTRIDGE (PAGE 4-60)".
9. Close drain valve (2), (3).
10. Add coolant mixed with antifreeze until it overflows from the water filler.  
Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.
11. To remove air in the cooling system, run the engine for 5 minutes at low idle, then for 5 minutes at high idle.  
(While doing this, leave the radiator cap removed.)
12. Drain the coolant from sub-tank (4), clean the inside of the sub-tank, then add water until the coolant level is between the FULL and LOW marks.
13. Stop the engine, wait for approx. 3 minutes, then add coolant until the coolant level is near the coolant filler port, and tighten the cap. Check the coolant level and add coolant if necessary.





### CHECK TRACK SHOE TENSION, ADJUST

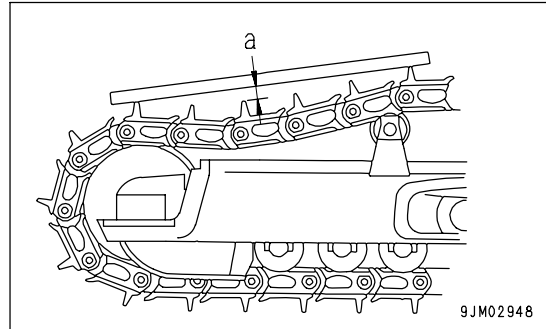
The wear of pins and bushings on the undercarriage will vary with the working conditions and types of soil. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

Carry out the check and adjustment under the same conditions as when operating (on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

#### INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance (a) is 20 to 30 mm (0.79 to 1.18 in), the tension is standard.

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



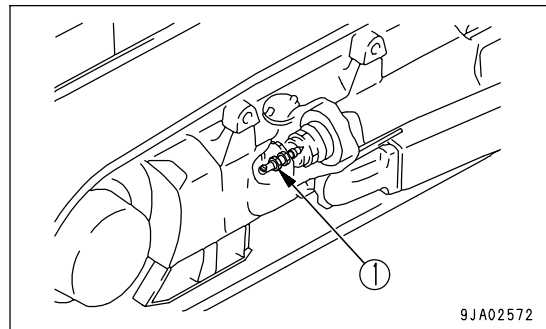
#### ADJUSTMENT

#### WARNING

There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.

Never loosen any part other than plug (1). Never put your face in the mounting direction of plug (1).

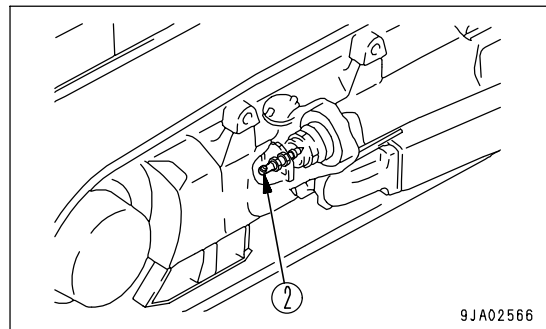
If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



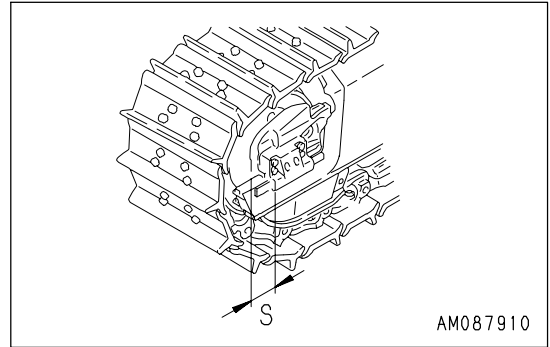
#### WHEN INCREASING TENSION

Prepare a grease gun.

1. Pump in grease through grease fitting (2) with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.



4. Continue to pump in grease until S becomes 0 mm. If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.

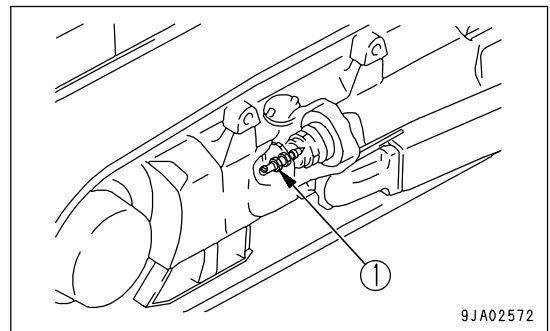


WHEN LOOSENING TENSION

**! WARNING**

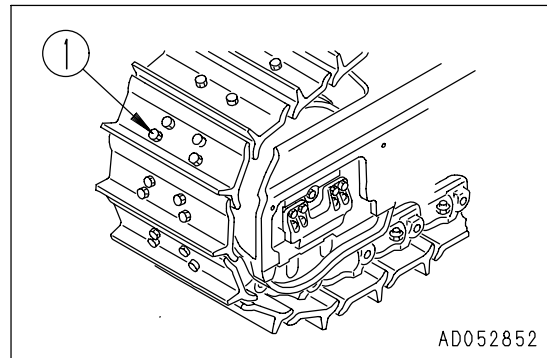
It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

1. Loosen plug (1) gradually to release the grease.
2. When loosening plug (1), turn it a maximum of one turn.
3. If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
4. Tighten plug (1).
5. To check that the correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.



## CHECK AND TIGHTEN TRACK SHOE BOLTS

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.



### METHOD OF TIGHTENING (TRACK SHOE BOLTS)

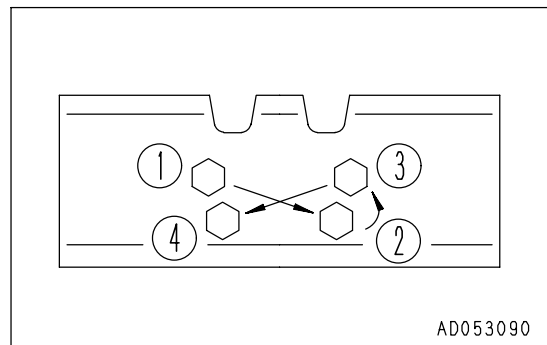
1. Torque the track shoe bolts to  $539 \pm 49$  N·m ( $55 \pm 5$  kg·m,  $398 \pm 36.2$  lb ft). Then ensure the nut and shoes are in close contact with the link contact surface.
2. After checking, tighten a further.  $120^\circ \pm 10^\circ$ .

### METHOD OF TIGHTENING (MASTER CONNECTING BOLT)

1. First tighten to a tightening torque of  $343 \pm 39$  N·m ( $35 \pm 4$  kgf·m,  $253 \pm 29$  lbf ft) then check that the link contact surfaces are in close contact.
2. After checking the link contact surfaces, tighten the bolt by  $180^\circ$  (Allowable range:  $0^\circ - 20^\circ$ ).

### ORDER FOR TIGHTENING

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



## CHECK ELECTRICAL INTAKE AIR HEATER

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

REVERSE AND REPLACE END BITS AND CUTTING EDGES



**WARNING**

It is dangerous if the work equipment moves during the turning or replacement operation.

Set the work equipment in a stable condition, set the work equipment lock lever to the LOCK position, then stop the engine.

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

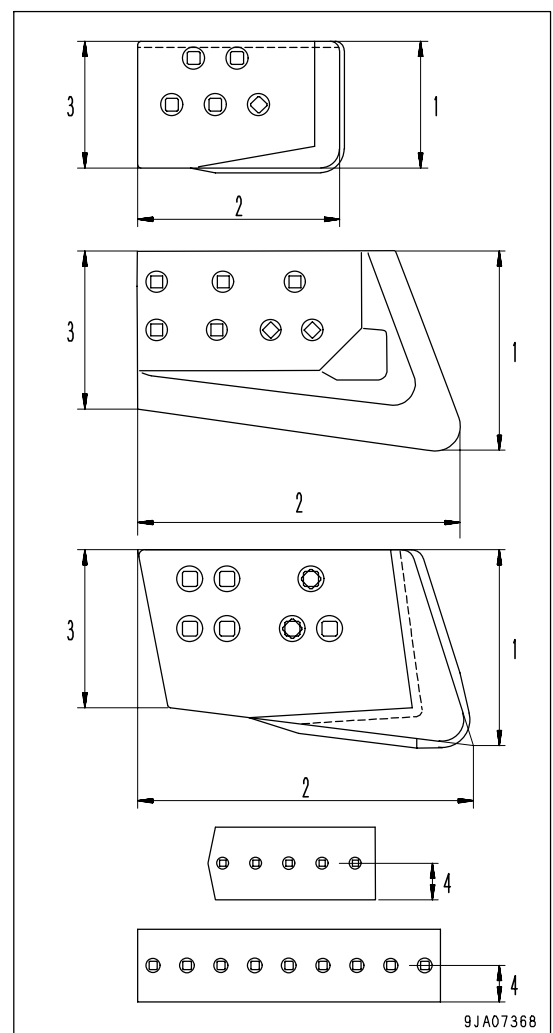
1. Raise the blade to a proper height, apply a block under the frame to prevent the blade from falling.
2. Set the safety lock lever to the LOCK position and stop the engine.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Wear standards

Item			Judgement criteria (mm)	
No.	Dimension to be measured	Work equipment	Basic dimension	Allowable max. value
1	Height of end bit (outside)	A,G	242	187
		B,C	204	187
		D	292	237
		E,F	315	237
		H	222	204
2	Width of end bit	A,B,C	325	300
		D	435	410
		E,F	540	515
		G,H	325	310
3	Height of end bit (inside)	A,B,C,G	204	187
		D,E,F	254	237
		H	222	204
4	Height of cutting edge (Center of bolt mounting hole to edge)	A to H	102	85

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

- A: Powertilt dozer (D65EX)
- B: Powertilt dozer (D65PX)
- C: Powertilt, Power pitch dozer (D65PX)
- D: Semi-U blade (3m)(D65EX)
- E: Semi-U blade (D65EX)
- F: Semi-U blade (D65WX)
- G: Angledozer (D65EX)
- H: Angledozer (D65PX)



REMARK

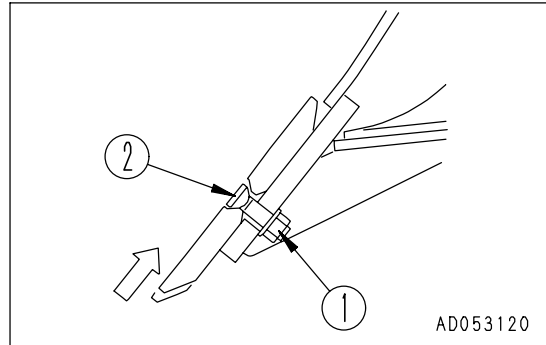
- If the cutting edge and the end bit on both sides are worn out, replace with new one.
- If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.

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:

Powerlift dozer :  $461 \pm 69$  N·m ( $47 \pm 7$  kgf·m,  $340 \pm 51$  lbft.)

Powerlift, Power pitch dozer :  $461 \pm 69$  N·m ( $47 \pm 7$  kgf·m,  $340 \pm 51$  lbft.)

Angledozer :  $441 \pm 49$  N·m ( $45 \pm 5$  kgf·m,  $325.5 \pm 36.2$  lbft.)

Semi-U dozer :

Cutting edge :  $461 \pm 69$  N·m ( $47 \pm 7$  kgf·m,  $340 \pm 51$  lbft.)

End bit :  $745 \pm 108$  N·m ( $76 \pm 11$  kgf·m,  $550 \pm 80$  lbft.)

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

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

### CLEAN, CHECK RADIATOR FINS

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

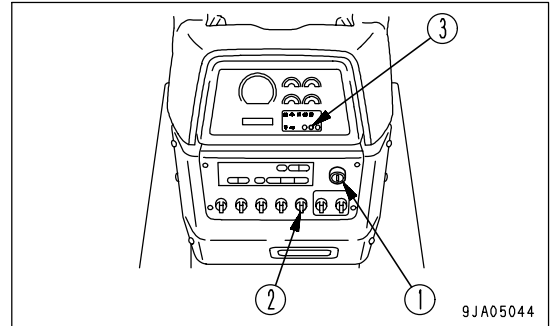
#### CLEANING BY ROTATING COOLING FAN IN REVERSE DIRECTION

**NOTICE**

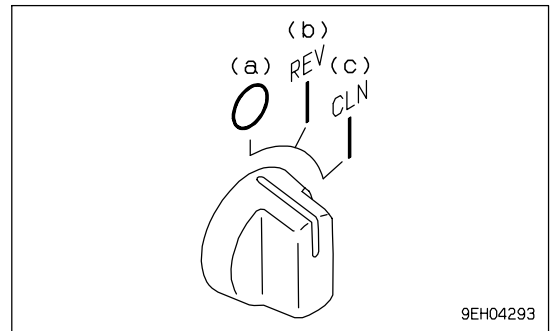
When rotating the cooling fan in the reverse direction, be extremely careful of flying dust.

When stopping the engine when the cooling fan is rotating in the reverse direction, first run the engine at low idling, then stop it.

The dust and dirt stuck to the radiator and cooler can be blown out by rotating the cooling fan in the reverse direction.

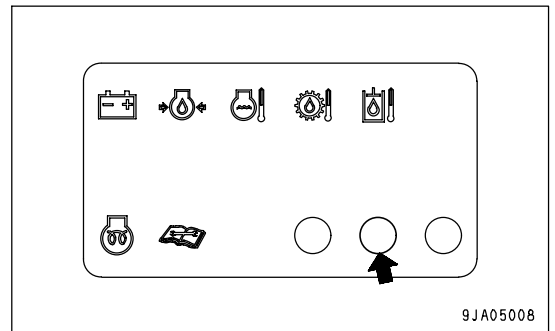


1. Turn starting switch (1) to the OFF position and stop the engine.
2. Turn starting switch (1) to the ON position.
3. Set fan rotation selector switch (2) to the cleaning position (CLN:(C)).



**REMARK**

If the engine is running, the direction of rotation of the fan will not change even when the fan rotation selector switch is operated. Fan operation confirmation lamp (3) will flash to inform the operator that the direction of rotation of the fan has not been switched. Stop the engine, then start it again. The direction of rotation of the fan will be switched.



4. Turn starting switch (1) to the START position and start the engine. The cooling fan will rotate in the reverse direction.
5. Run the engine at high idling.
  - Select the time for running the engine at high idling as follows according to the condition of clogging.
  - Normal clogging: 1 to 2 minutes
  - Excessive clogging: 2 to 3 minutes
6. After completing the cleaning, run the engine at low idling for approx. 10 seconds.
7. Turn starting switch (1) to the OFF position and stop the engine.
8. Turn starting switch (1) to the ON position.
9. Turn the fan rotation selector switch (2) to the normal rotation position (a) and cancel the reverse rotation.

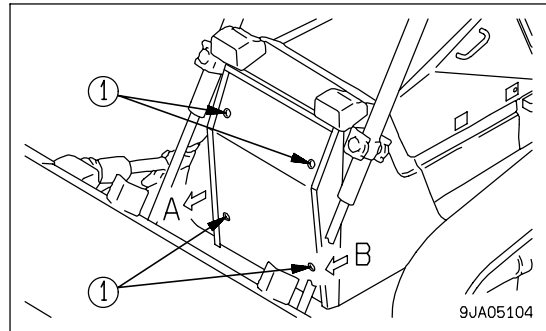
## CLEANING WITH COMPRESSED AIR

**WARNING**

If compressed air, high-pressure water, or steam hit your body directly, or they cause dirt or dust to be blown up, there is a hazard of serious injury. Always use safety glasses, dust mask, or other protective equipment.

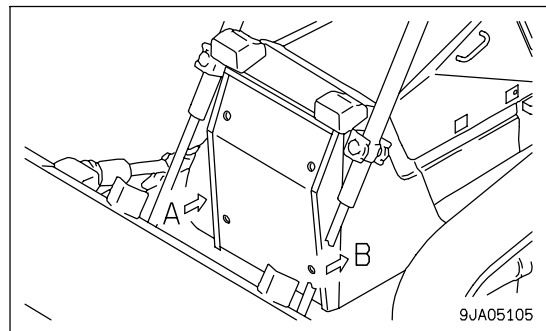
If there is severe clogging of the radiator fins with dust, use compressed air to clean.

1. Remove bolts (1) (4 bolts).
2. Open the A side (hinge side) of the radiator mask. It opens approx. 10 mm (0.4 in).
3. Open the B side of the radiator mask.
4. 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 hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.

5. When closing the radiator mask, always push in the A side first, then push in the B side, align the bolt holes, and tighten bolts (1).

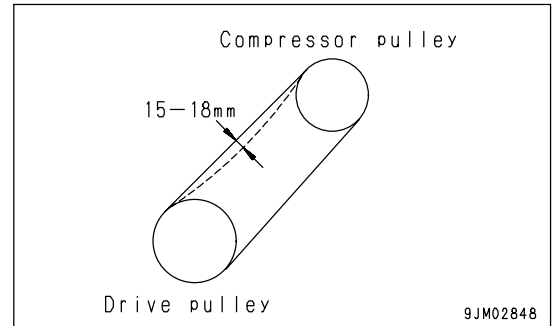


### CHECK, ADJUST AIR CONDITIONER

(Machines 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. 98 N (10 kgf)) and check that the tension is 15 to 18 mm (0.59 to 0.71 in). When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.

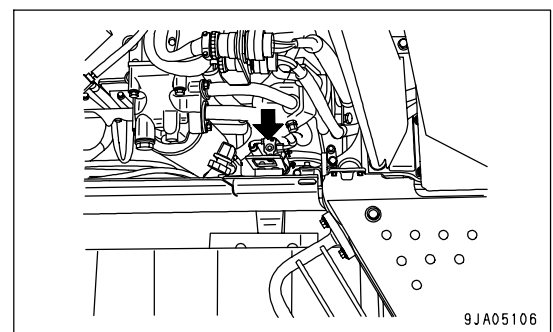


#### CHECK LEVEL OF REFRIGERANT



If the refrigerant used in the air conditioner gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit. Do not bring any flame close to any point where the refrigerant gas is leaking.

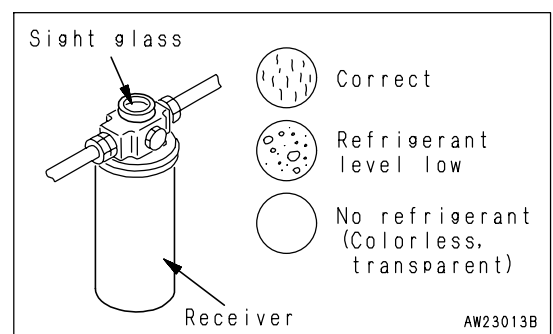
If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idling, and check the flow of the refrigerant in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.



- 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 AIR CONDITIONER OFF-SEASON

Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.

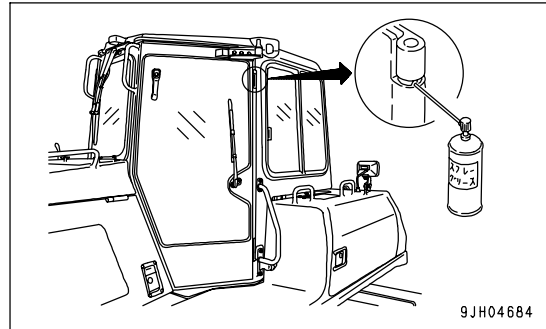


## GREASE DOOR HINGE

(Machines equipped with cab)

If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the split in the hinge bushing.

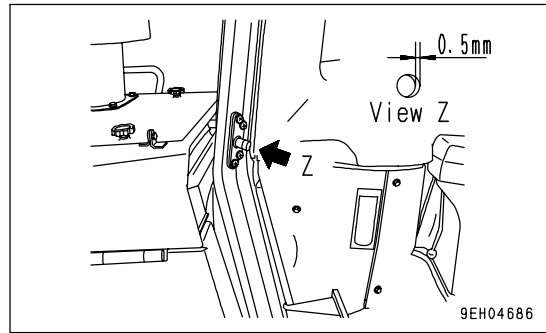
If the bushing is worn, replace the hinge.



## CHECK DOOR LOCK STRIKER

(Machines equipped with cab)

If the wear of the door lock striker exceeds 0.5 mm (0.02 in), 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.

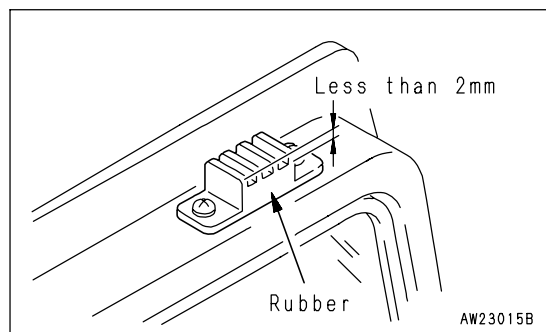


## REPLACE DOOR DAMPER

(Machines equipped with cab)

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

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



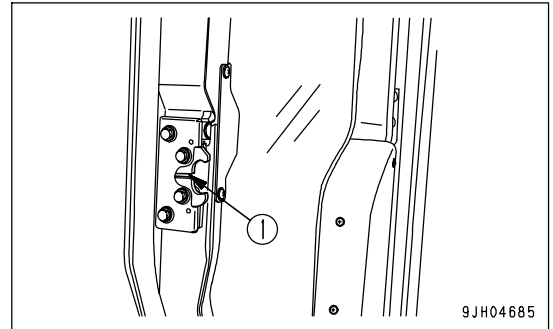
**CHECK DOOR LATCH**

(Machines equipped with cab)

Hold the door open and check that there is still grease inside the latch. If the amount of grease is low or there is no more grease, coat the inside of the latch with grease from portion (1).

**REMARK**

If there is no more grease inside the latch, the movement will become poor because of dust inside the latch, and the handle may be stiff when opening the door.



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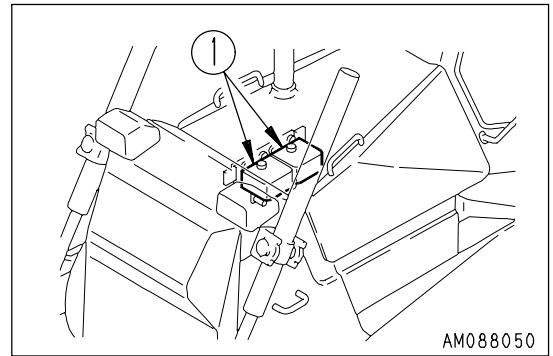
**CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID**

(Machines equipped with cab)

If there is air in the window washer fluid, check the level and add fluid.

Open the engine side cover on the right side, check the level of the fluid in window washer tank(1), and if it is low, add automobile window washer fluid.

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



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**PROPORTION FOR MIXING FLUID WITH WATER**

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

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

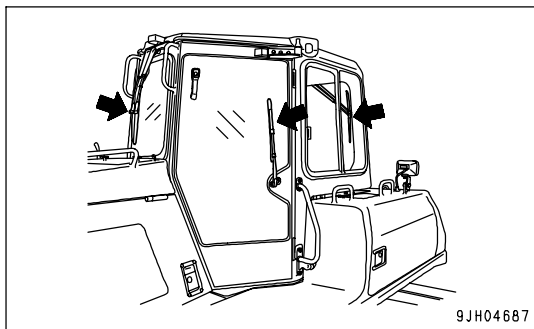
There are two types depending on the freezing temperature:

-10°C (14°F) (general use) and -30°C (-22°F) (cold area use), so select according to the area and season.

### REPLACE WIPER BLADE

(Machines equipped with cab)

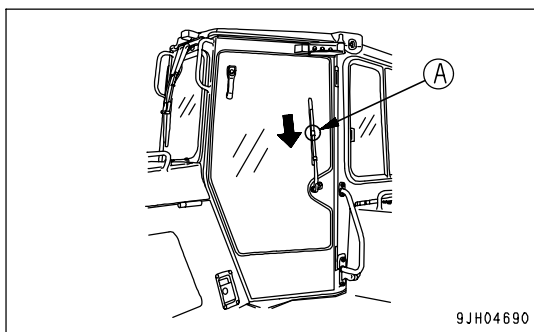
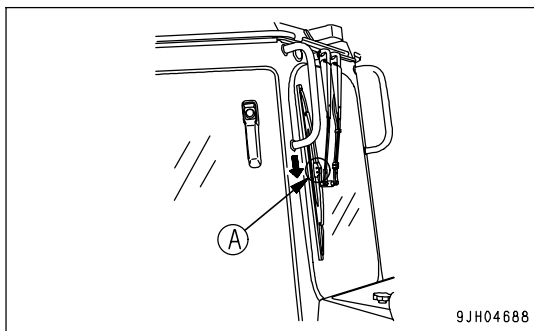
If the blade is damaged, it will not wipe the window clean, so replace the blade.



### REPLACEMENT

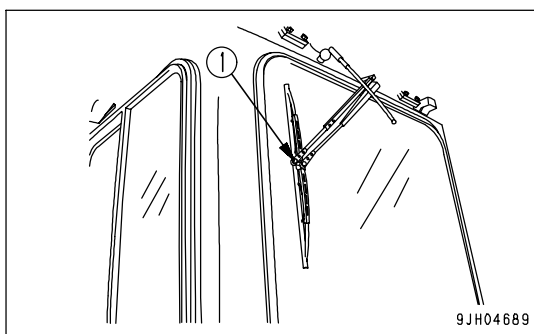
#### FRONT, DOOR WIPER

1. It is hooked at portion (A), so move the blade in the direction of the arrow to remove it.
2. Install the new blade and hook it securely.



#### REAR WIPER

1. Remove E-ring (1).  
The blade can then be removed.
2. Install a new blade, then install securely with E-ring (1).



**CHECK IDLER OIL LEVEL, ADD OIL**



**WARNING**

If the oil level in the idler is low, new oil must be added, and the machine body must be inclined in this case. Since this work is dangerous, ask your Komatsu distributor.

If the oil level in the idler is low, noise will be generated and there will be seizure, so check the oil level and add oil as follows.

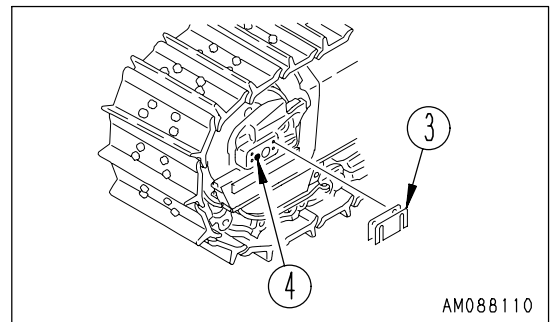
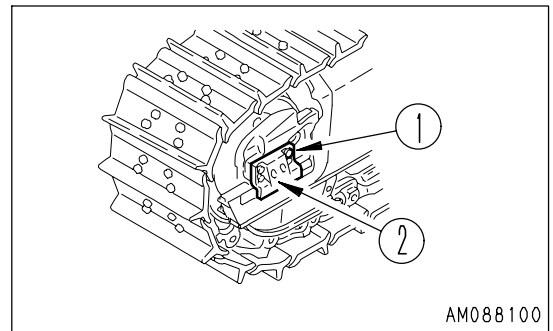
**INSPECTION**

1. Remove bolt (1), then remove guide plate (2) and shim (3).

**REMARK**

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

2. Loosen plug (4) slowly. If oil oozes through the threads at this time, the quantity of oil is sufficient. Tighten plug (4).
3. If any oil does not flow out when plug (4) is removed, the quantity of oil is insufficient. In this case, ask your Komatsu distributor for repair.
4. Install guide plate (2) and shim (3) with bolt (1).



**REMARK**

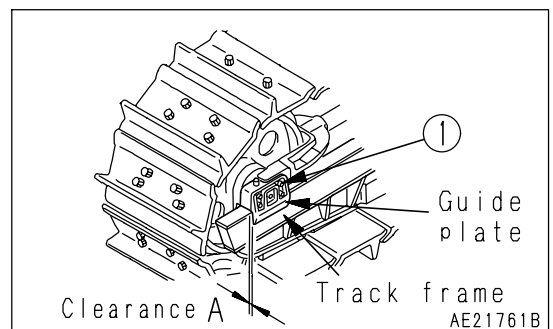
When installing guide plate (2), install the same number and thickness of shim (3) as removed in Step 1. The optimum clearance may be obtained, if the adjustment is made at the same time. For details of adjusting the shim thickness, see "ADJUST IDLER CLEARANCE (PAGE 4-37)".

**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 2 m (3 ft 3 in to 6 ft 7 in) 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 4.0 mm (0.16 in), loosen bolt (1), and pull out the shim to adjust the clearance at one end to 0.5 to 1.0 mm (0.02 to 0.04 in).  
Thickness of one shim is 1.0 mm (0.04 in).



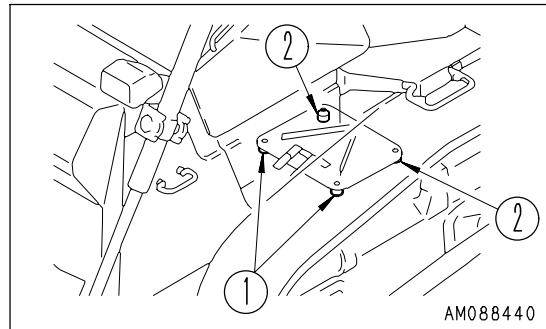
## LUBRICATING UNIVERSAL JOINT

**WARNING**

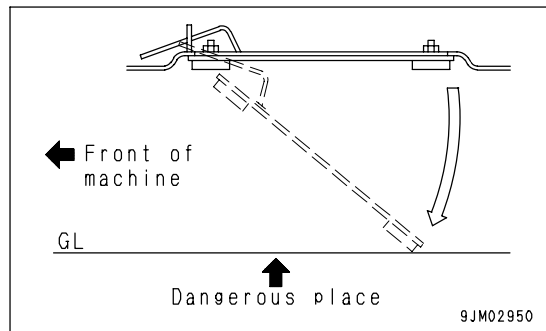
The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.

1. Remove the undercover from the rear bottom of the machine body as follows.

- 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.



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



## PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM

See "STARTING ENGINE (PAGE 3-82)".

Since the engine must be started and the blade must be operated, see OPERATION.

### NOTICE

**If the engine is run at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.**

1. Bleed air from left pitch cylinder  
(Powertilt, Power pitch dozer only)

Bleeding air from the hydraulic system is required when removing and installing the work equipment or when making the repairs.

- 1) Bring the blade to the RAISE position and run the engine under no load at low range.
- 2) Bleeding air in the tilt hydraulic circuit by repeating left and right tilt operation five to ten times.
- 3) Bleeding air from the bottom of left cylinder by operating the blade to pitch forward and backward 5 to 10 times repeatedly.
- 4) Set the left and right cylinders at the neutral position, then carry out the following operations 5 to 10 times to bleed the air from the head end of the left pitch cylinder.

(1) Forward pitch → (2) Left tilt → (3) Right tilt → (4) Backward pitch

2. Bleeding air from cylinders

- 1) Run the engine at low idling, and extend and retract each cylinder 4 to 5 times, taking care so that a cylinder may not be brought up to its stroke end. (Stop the cylinder approx. 100 mm (3.9 in) short of its stroke end)
- 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.

## CHECK BEFORE STARTING

For details of the following items, see "CHECK BEFORE STARTING (PAGE 3-68)" in the OPERATION section.

- Check oil level in engine oil pan, add oil
- Check dust indicator
- Check, drain water separator
- Check coolant level, add coolant
- Check oil level in power train case, add oil
- Check electric wiring
- Check brake pedal travel
- Checking with machine monitor
- Check fuel level, add fuel
- Check horn sound
- Check that lamps light up
- Check backup alarm sound

## EVERY 50 HOURS SERVICE

### DRAIN WATER, SEDIMENT FROM FUEL TANK

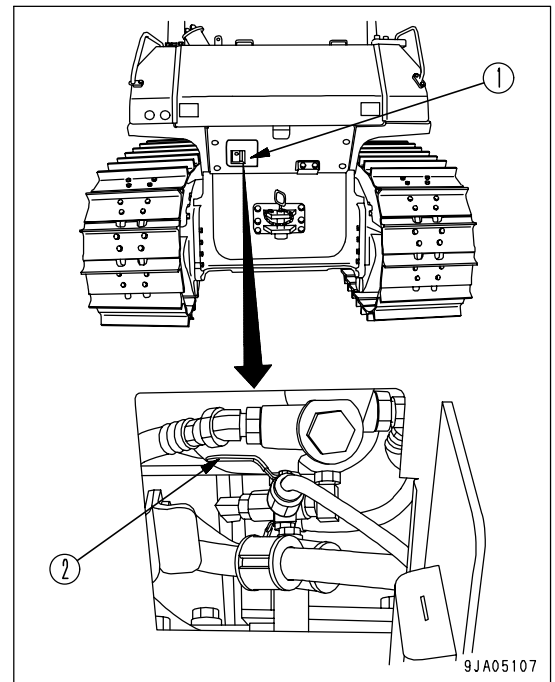
Carry out this check before operating the machine.

- Prepare a container to catch the fuel that is drained.

1. Open cover (1).
2. Open valve (2) at the bottom of the tank and drain the sediment and water that has accumulated at the tank bottom together with fuel.

When doing this, be careful not to get fuel on yourself.

3. When clean fuel comes out, close drain valve (2).





## EVERY 250 HOURS SERVICE

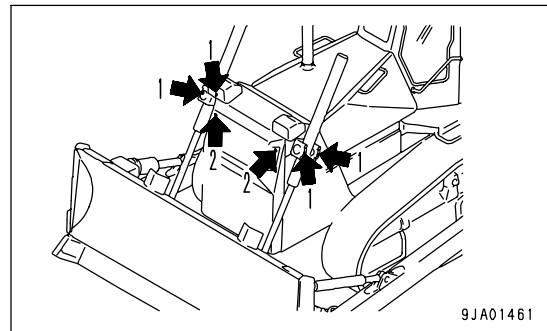
Maintenance for every 50 hours service should be carried out at the same time.

### LUBRICATING

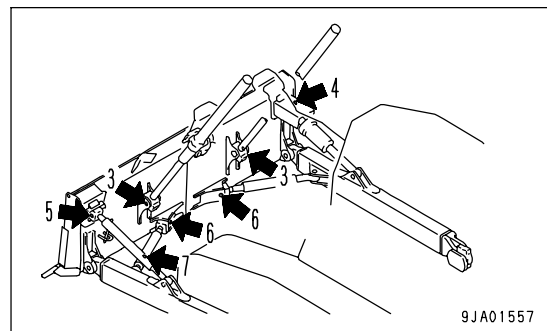
1. Lower the blade to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

### POWER TILTDOZER

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)

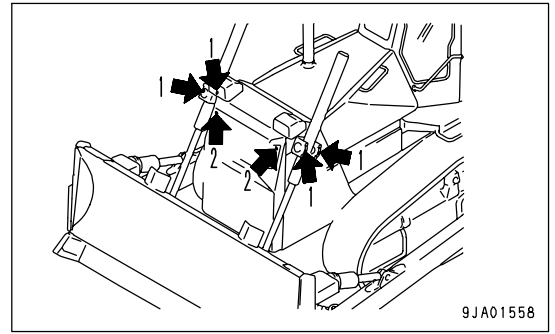


- (3) Lift cylinder ball joint (2 places)
- (4) Tilt cylinder ball joint (1 place)
- (5) Tilt brace ball joint (1 place)
- (6) Brace ball joint (2 places)
- (7) Tilt brace thread (1 place) (screw-adjustable)



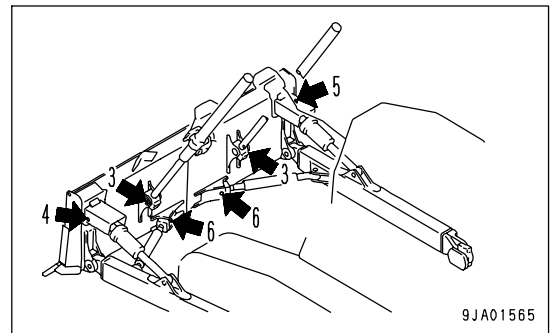
**POWER TILT-POWER PITCH DOZER**

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



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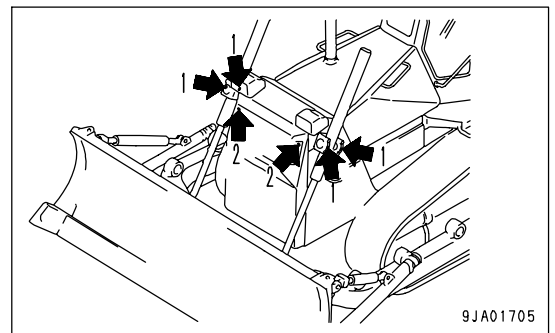
- (3) Lift cylinder ball joint (2 places)
- (4) Tilt cylinder ball joint (1 place)
- (5) Pitch cylinder ball joint (1 place)
- (6) Brace ball joint (2 places)



9JA01565

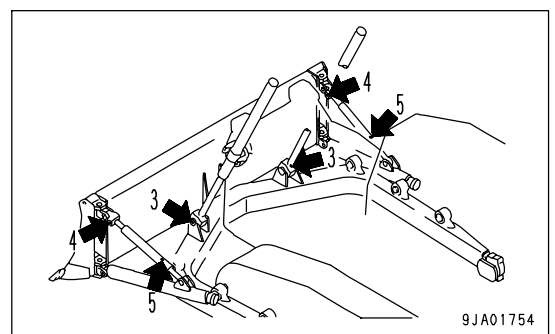
**ANGLED OZER**

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



9JA01705

- (3) Lift cylinder ball joint (2 places)
- (4) Tilt brace ball joint (2 places)
- (5) Tilt brace thread (2 places)



9JA01754

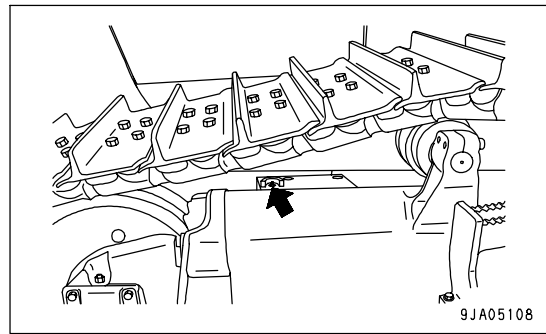
## GREASE EQUALIZER BAR SIDE PIN

Left and right, 2 places each

1. Remove all dirt from the top of the track frame and cover.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.

### REMARK

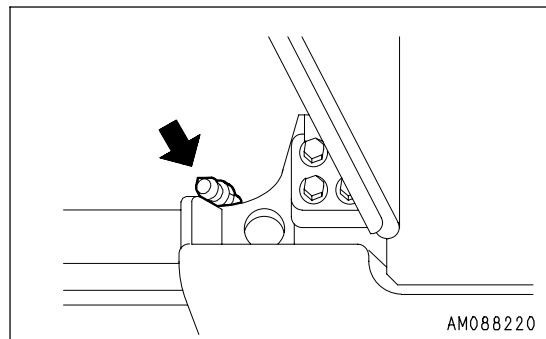
- Supply 3 shots of grease (Operate the grease pump lever 3 times) to each grease fitting, and check that grease is newly discharged through the seal lip.
- If grease is not newly discharged through the lip, continue supplying grease until it is discharged.



## GREASE EQUALIZER BAR CENTER PIN

(1 place)

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

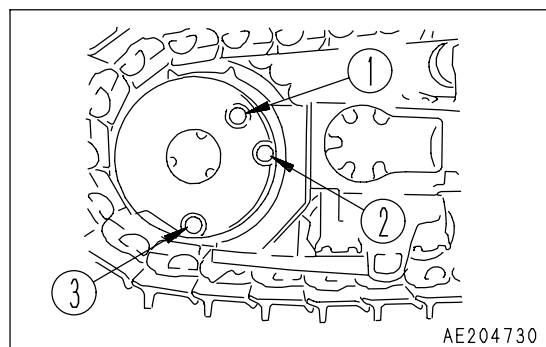


## CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

### ! WARNING

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out.  
Loosen the plug slowly to release the pressure.

1. Stop the machine so that drain plug (3) is directly at the bottom.
2. Remove oil level plug (2) and check whether the final drive case is filled with oil to lower edge of the plug hole.
3. If the oil level is too low, add oil through the oil filler plug hole(1).
4. When oil starts to overflow from oil level plug (2), stop filling and install oil level plug (2) and oil filler plug (1).



CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

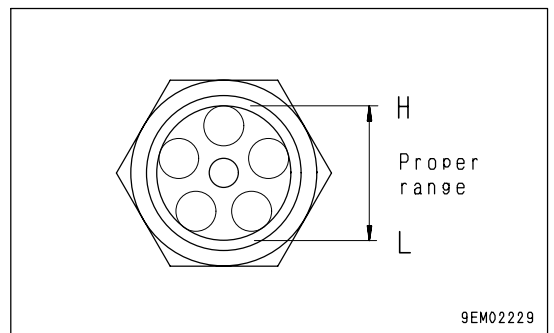
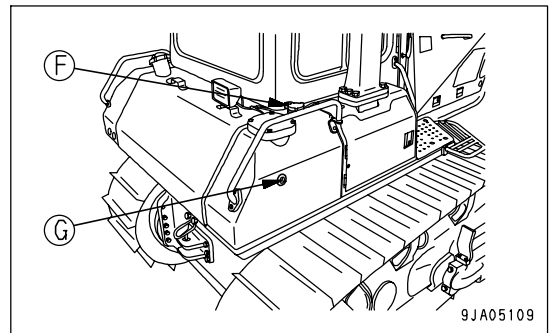
**! WARNING**

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

NOTICE

- Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.
- Always lock the cap with the key.

1. Lower blade to the ground and stop the engine. Wait for 5 minutes before checking oil level. Oil level should be between the H and L in sight gauge (G).
2. If the level is below the L mark, add oil through oil filler (F).
3. After adding oil, be sure to screw on the oil filler cap and lock it with the key.



## CHECK LEVEL OF BATTERY ELECTROLYTE

Perform this check before operating the machine.



### WARNING

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

### NOTICE

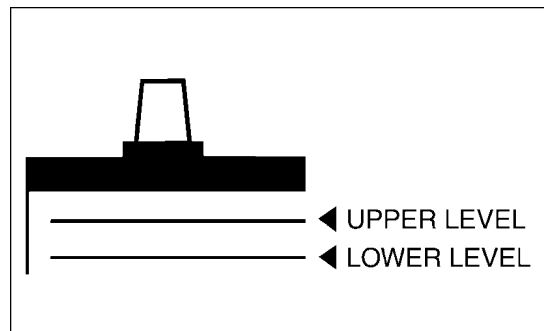
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

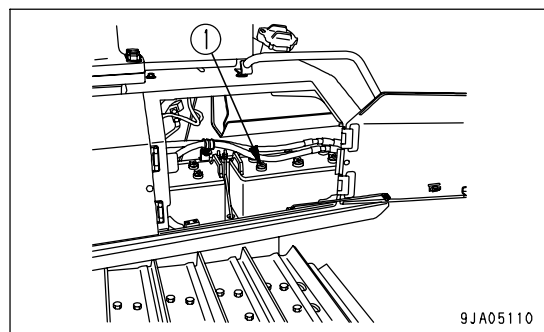
### WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

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

1. Open the battery cover on the left side of the machine body.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L.) and LOWER LEVEL (L.L.) lines.  
If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.



3. If the electrolyte level is below the midway point between the U.L. and L.L. lines, remove cap (1) and add distilled water to the U.L. line.
4. After adding distilled water, tighten cap (1) securely.



### REMARK

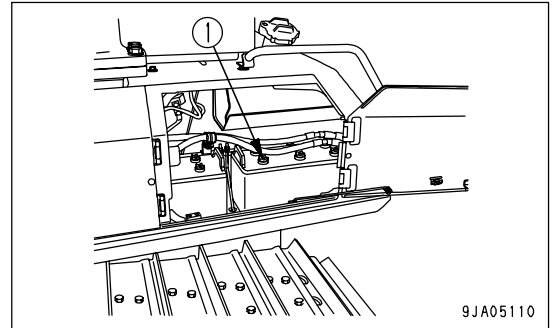
If distilled water is added to above the U.L. line, use a syringe to lower the level to the U.L. line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

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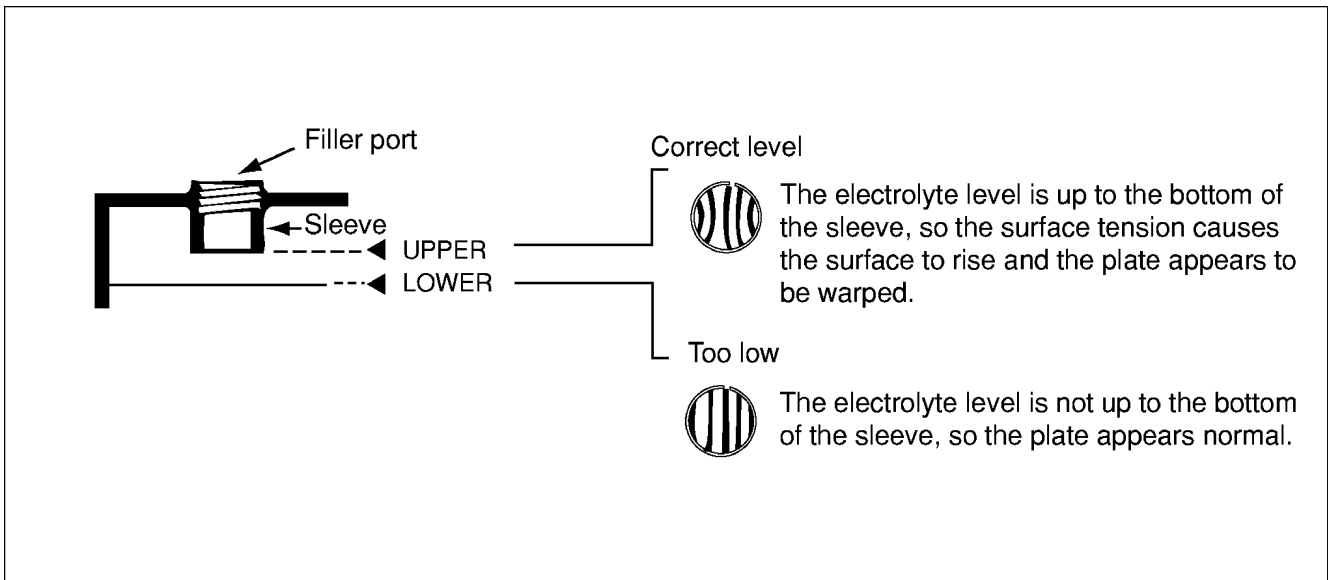
**WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY**

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

1. Open the battery cover on the left side of the machine body.
2. Remove cap (1) at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.



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



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

**REMARK**

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

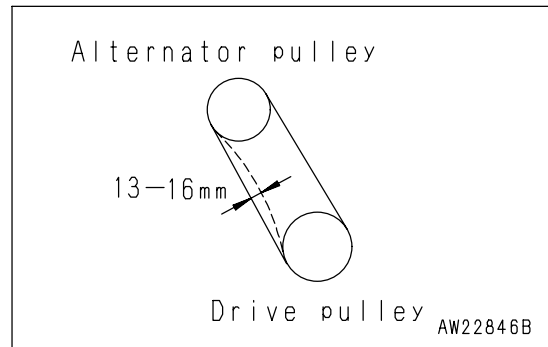
**WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL**

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

## CHECK ALTERNATOR DRIVE BELT TENSION, ADJUST

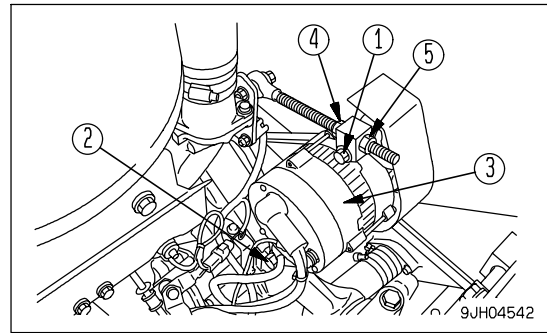
### CHECKING

The standard deflection for the drive belt is approx. 13 to 16 mm (0.51 to 0.63 in) when pressed by thumb (approx. 10 kg (22.05 lb)) at a point midway between the drive pulley and alternator pulley.



### ADJUSTING

1. Loosen bolts (1) and nuts (2), (4), and (5), then turn nut (4) and adjust the belt tension.
2. After adjusting, tighten bolts and nuts (2), (4), and (5), to secure alternator (3) in position.



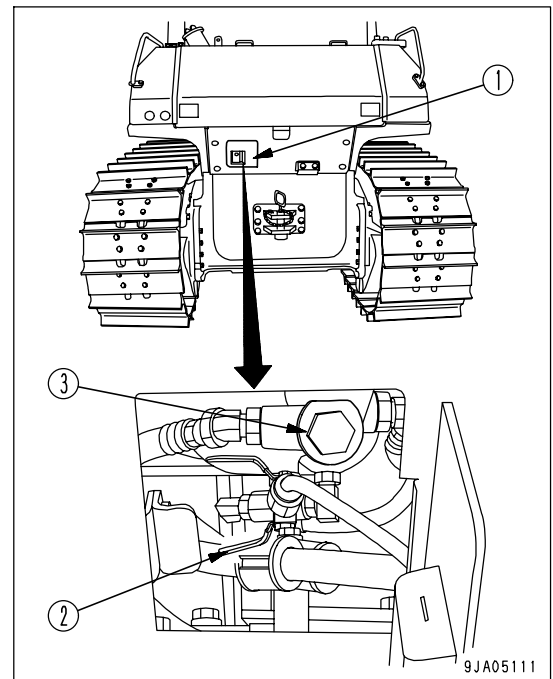
### REMARK

- 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.

**CHECK, CLEAN ADDITIONAL FUEL STRAINER**

(If equipped)

1. Open cover (1).
2. Close fuel supply valve (2), then remove strainer cap (3).  
The strainer forms one unit with the strainer cap.
3. Remove any dirt stuck to the strainer, then wash in clean diesel fuel or flushing oil. If the strainer is damaged, replace it.
4. After checking and cleaning, install the strainer, then tighten cap (3).
5. After installing, open fuel supply valve (2).





## CHECK BRAKE PERFORMANCE

**WARNING**

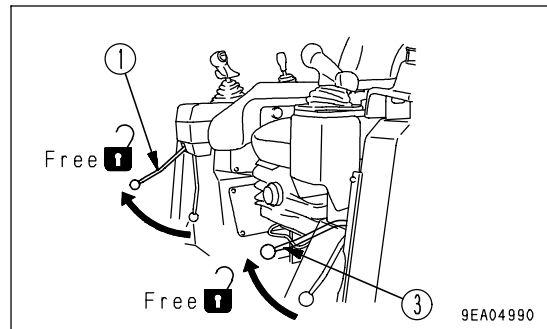
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

**NOTICE**

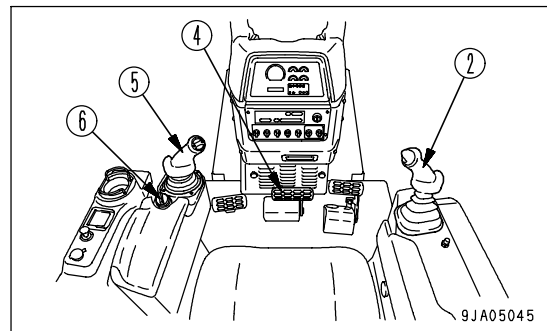
Do not place the gear shift lever in 1st under any circumstances. The machine will be damaged.

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

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



4. Depress brake pedal (4), set steering, forward-reverse, gear shift lever (5) in FORWARD, then press the shift up button to enter 2nd speed.
5. Operate fuel control dial (6) and gradually raise the engine speed to full throttle. (Keep the brake pedal depressed.)
6. Check that the machine does not move. This indicates that brake performance is normal.



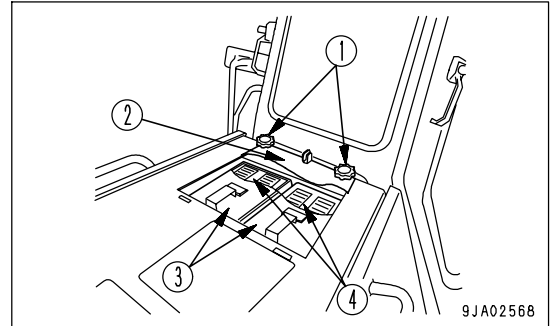
**CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER)**

(Machines equipped with cab)

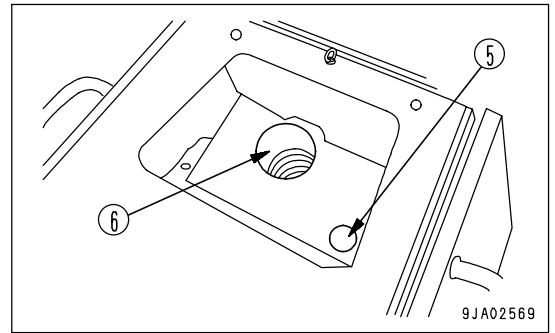
Clean the air conditioner air filter if it becomes clogged or if there is dirt or oil stuck to it.

In places where there is a lot of dust, clean the air filter once a week. In addition, clean the air conditioner air filter at the same time, when cleaning the engine air cleaner.

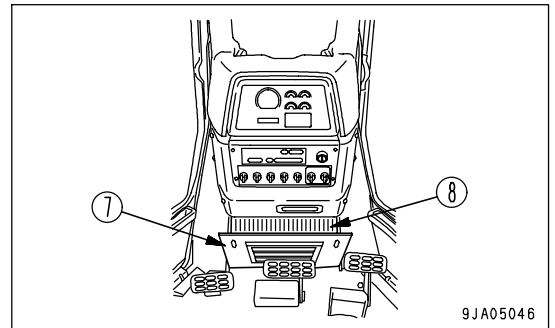
1. Loosen mounting bolts (1), pull up inspection cover (2) to the rear, and remove it.
2. Remove inside cover (3), then remove FRESH filter (4).



3. Remove the filter box, then brush out the dirt accumulated inside the box through the cleaning hole (5) in the hood. When doing this, be careful not to let any dirt or dust get into the fresh air intake port (6) leading to the cab.



4. Open inspection cover (7) under the front panel, then pull up RECIRC filter (8) and remove it.
5. Clean filters(4) and (8) with compressed air. If the filters are stained with oil or extremely dirty, wash them in neutral detergent. After washing the filters, dry them up, then install them.



**REMARK**

If the filters cannot be cleaned with air or in water, replace them with new ones.

## EVERY 500 HOURS SERVICE

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

### REPLACE FUEL FILTER CARTRIDGE



#### WARNING

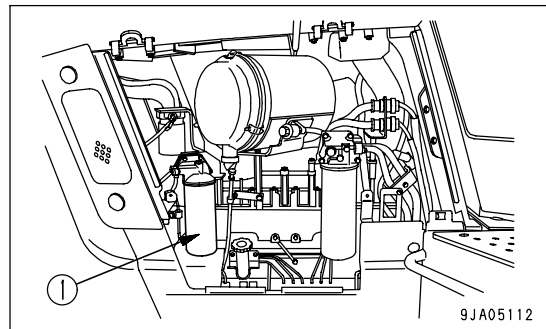
- After the engine has been operated, all parts are at high temperature, so do not replace the filter immediately. Wait for all parts to cool down before starting the operation.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before replacing the filter.
- Do not bring any fire or flame close.

#### NOTICE

- Genuine Komatsu fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle. If any part other than a genuine Komatsu filter cartridge is used, dust or dirt may get in and cause problems with the injection system. Always avoid using substitute parts.
- When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.

Prepare a filter wrench and a container to catch the fuel.

1. Set the container under the filter cartridge to catch the drained oil.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. Clean the filter holder.

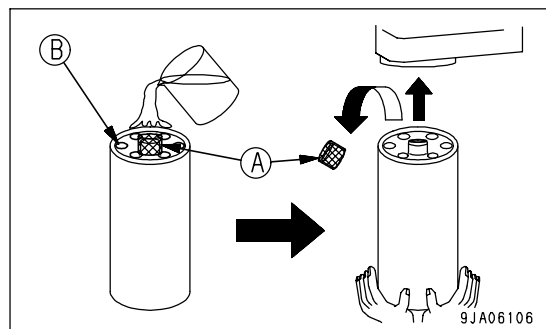


#### NOTICE

When filling the filter cartridge with fuel, carry out the filling operation with cap (A) fitted.

Cap (A) acts to prevent the entry of dirt or dust into the filter cartridge.

4. Fill the filter cartridge with clean fuel through the 8 small holes (B) in the new filter cartridge.
5. Coat the packing surface of the filter cartridge with oil.

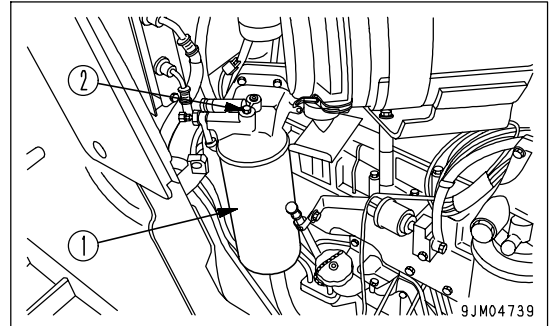


6. Remove filter cartridge cap (A) and install to the filter holder.

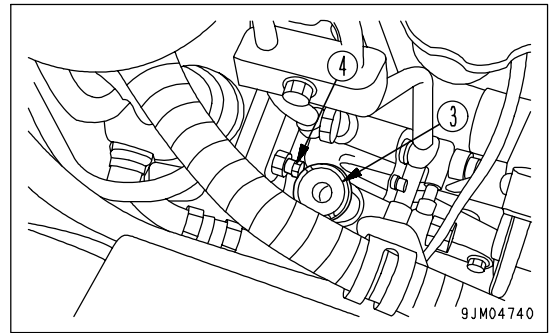
7. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.

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.

8. After replacing filter cartridge (1), loosen air bleed plug (2).
9. Loosen the knob of priming pump (3), then pump the knob until no more bubbles come out of air bleed plug (2).
10. Tighten air bleed plug (2).  
Tightening torque: 7.8 to 9.8 N·m (0.8 to 1 kgf·m, 5.8 to 7.2 lbft)



11. Loosen air bleeder (4) of the supply pump.
12. Pump priming pump (3) until no more bubbles come out with the fuel from air bleeder (4), then tighten air bleeder (4).  
Tightening torque: 4.9 to 6.9 N·m (0.5 to 0.7 kgf·m, 3.6 to 5.1 lbft)



13. Continue pumping (approx. 50 times) until the priming pump (3) becomes stiff and the overflow valve release sound becomes continuous.
14. Push the knob of priming pump (3) in and tighten it.
15. 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. If there is still leakage of fuel, follow Step 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 cartridge with a new part, then repeat Steps 3 - 12 to install the filter cartridge.

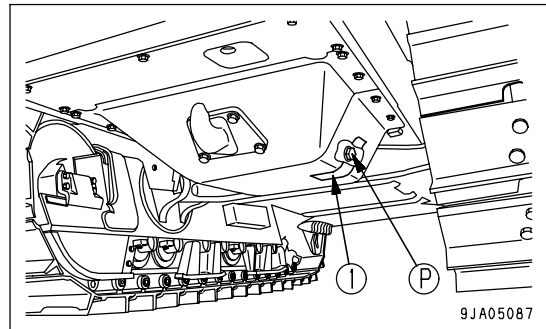
## CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

**WARNING**

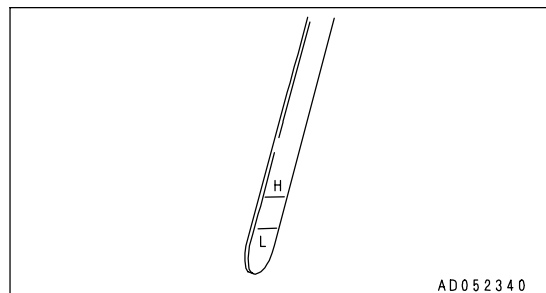
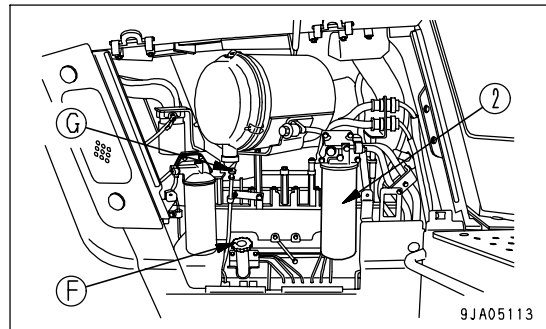
Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.

- Refill capacity: 38 liters (10.04 US gal)
- Prepare a socket wrench and filter wrench.

1. Remove the cover (1) on the bottom of the machine and set a container to catch the drained oil directly under the drain plug.
2. Loosen drain plug (P) (with a slit) slowly to avoid getting oil on yourself, and drain the oil.
3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
4. Install drain plug (P).



5. Open the engine side cover on the left side of the chassis.
6. Using the filter wrench, turn engine oil filter cartridge (2) to the left and remove it.
7. Clean the filter holder, fill the new filter cartridge with clean engine oil, coat the thread and packing surface of the new filter cartridge with clean engine oil (or coat it thinly with grease), then install it to the filter holder.
8. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 to 1 turn.
9. After replacing the filter cartridge, add engine oil through oil filler port (F) so that the oil level is between the H and L marks on dipstick (G).
10. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (PAGE 3-68)".

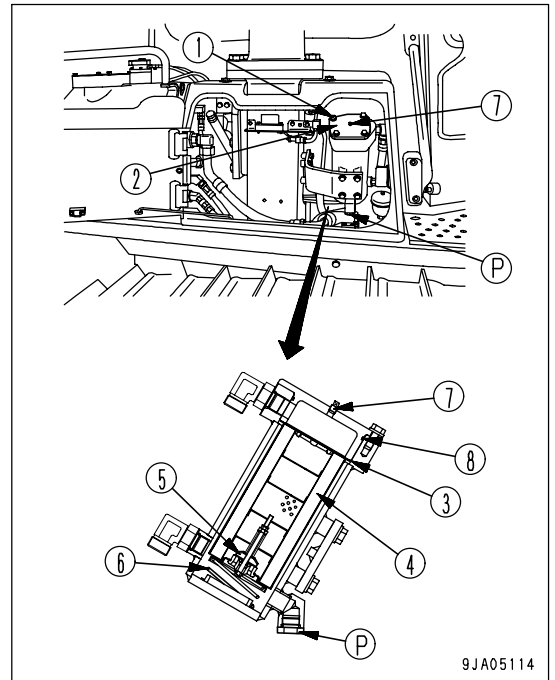


REPLACE POWER TRAIN OIL FILTER ELEMENT

**! WARNING**

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

1. Open cover on the right side of the machine.
2. Remove bolts (1) (4 bolts), then remove cover (2).
3. Remove the grommet under the fender, loosen drain plug (P), and drain the oil from inside the filter case.
4. Take out plate (3), element (4), valve (5), and spring (6).
5. Clean the inside of the case, then wash plate (3), valve (5), and spring (6).
6. Install spring (6), valve (5), new element (4), and plate (3).
7. Replace O-ring (8) with a new part, then install cover (2) with bolt (1).
8. Install drain plug (P).
9. Loosen air vent plug (7) and start engine. Tighten the plug when oil comes out.



## 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)

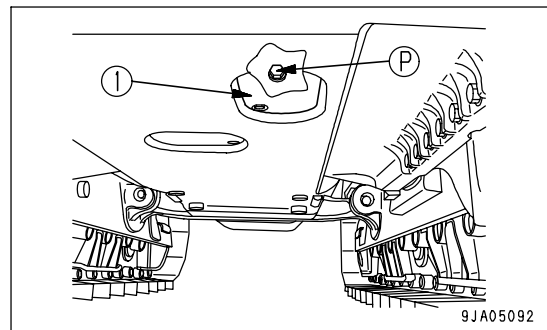


#### WARNING

- 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(3), carry out the work from the rear of the cover so that you can easily get out of the way.

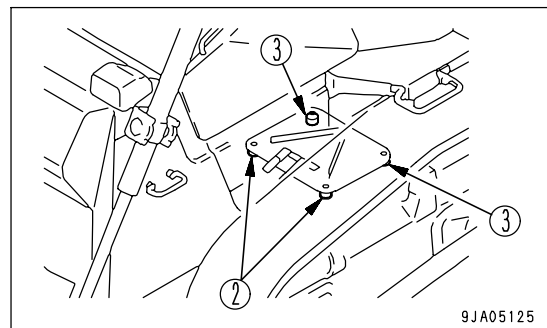
- Refill capacity: 48 liters (12.68 US gal)

1. Remove cover (1) at the bottom rear of the machine.
2. Loosen drain plug (P) (with slit) and drain the oil.  
After draining the oil, tighten drain plug (P).

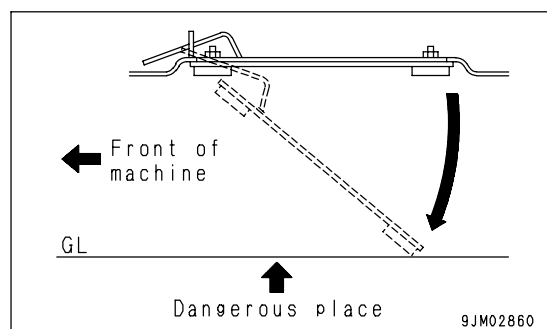


3. Remove the undercover from the rear bottom of the machine body as follows.

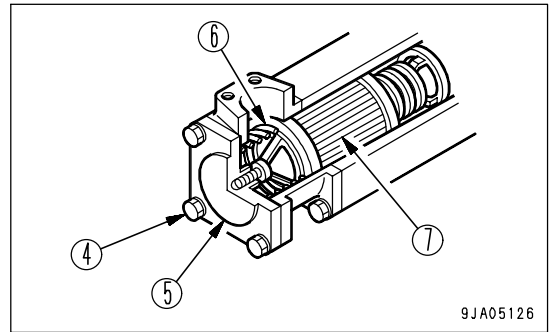
- 1) Remove two bolts (2) from the front side of the machine body.
- 2) Holding the cover, remove two bolts (3) from the rear side of the machine body.



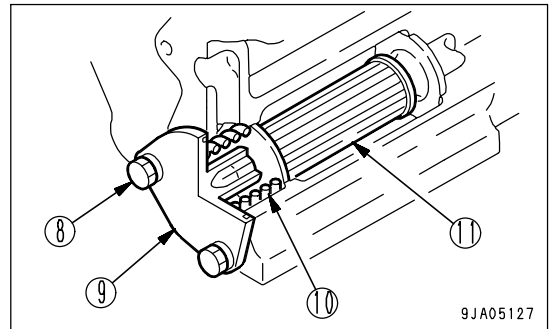
- 3) Lower and open the cover gradually.



4. Loosen mounting bolt (4) of the power train strainer, then remove cover (5).
5. Take out spring (6), then take out strainer (7).
6. Remove all dirt from strainer (7), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.

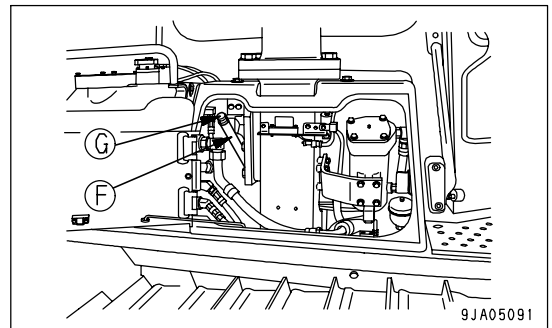


7. Loosen mounting bolt (8) of the scavenging pump strainer, then remove cover (9).
8. Take out spring (10), then take out strainer (11).
9. Remove all dirt from strainer (11), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.



If the spring or strainer are damaged, replace them.

10. Install the strainers to their original position.
11. After installing, replace the element in the power train oil filter. For details, see "REPLACE POWER TRAIN OIL FILTER ELEMENT (PAGE 4-55)".
12. Open cover on the right side of the machine.
13. Refill the specified quantity of oil through oil filler (F).
14. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL (PAGE 3-71)".
15. Close the cover at right side of machine.

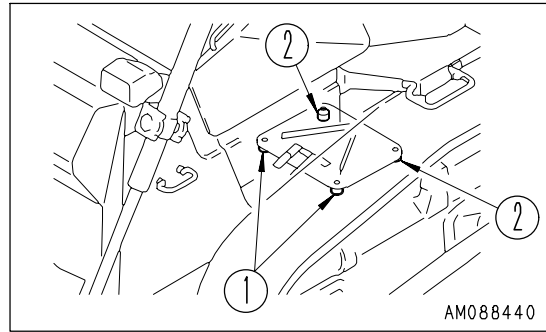




**CHECK OIL LEVEL IN DAMPER CASE, ADD OIL**

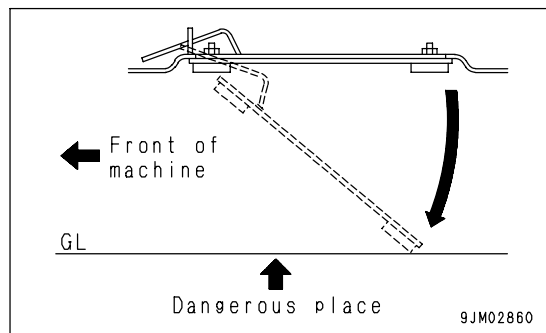
**! WARNING**

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



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

1. Remove the undercover from the rear bottom of the machine body as follows.
  - 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.

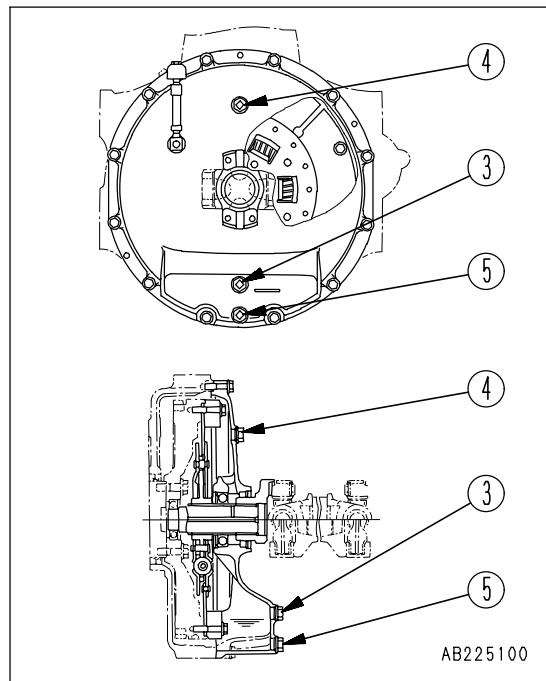


2. Remove oil level plug (3) and check the oil level. The proper oil level is the bottom edge of the plug hole. Tighten plug (3).

**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 oil until the oil level reaches the bottom edge of oil level plug (3).
4. After adding the oil, tighten plugs (3) and (4).

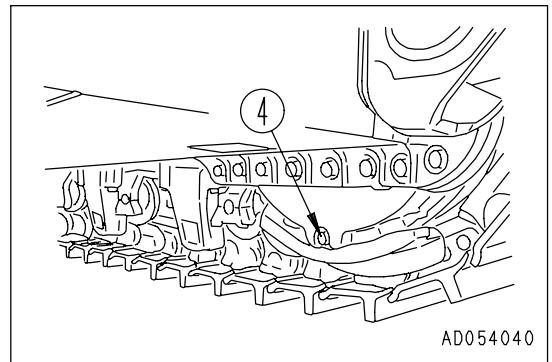
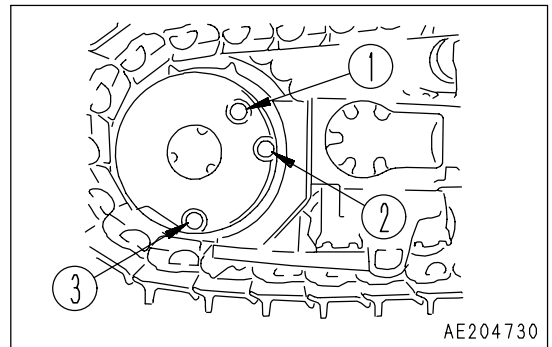


**CHANGE OIL IN FINAL DRIVE CASE**

**! WARNING**

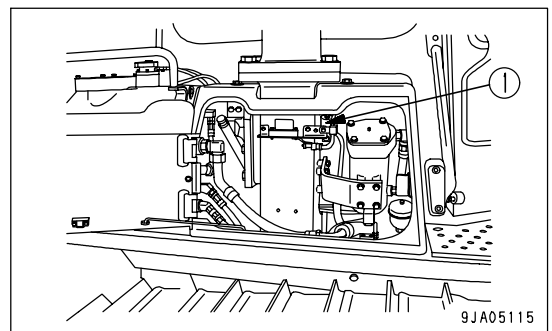
- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out.  
Loosen the plug slowly to release the pressure.

- Refill capacity:  
D65EX : (each) 24 liters (6.34US gal)  
D65PX,WX: (each) 27 liters (7.13US gal)
1. Stop the machine so that drain plug (3) is directly at the bottom.
  2. Remove oil level plug (2) and oil filler plug (1), then remove drain plugs (3) and (4), and drain the oil.
  3. After draining the oil, install drain plugs (3) and (4).
  4. Add oil to the specified level through the hole in oil filler plug (1).
  5. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL (PAGE 4-44)".



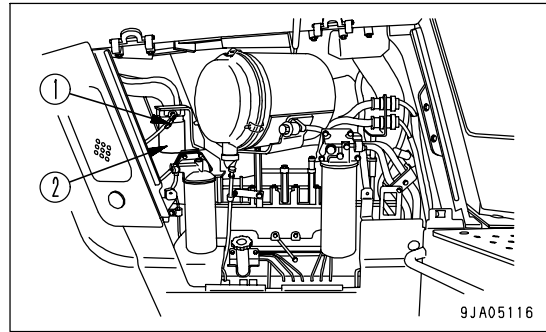
**CLEAN BREATHER**

1. Open cover on the right side of the machine.
2. Remove breather (1), then use clean diesel fuel or flushing fluid to rinse the dirt out from the inside.



## REPLACE CORROSION RESISTOR CARTRIDGE

1. Screw in 2 valves (1) at the top of the corrosion resistor.
2. Using a filter wrench, turn cartridge (2) to the left to remove it.
3. Apply engine oil to the sealing surface of a new cartridge, then install it to the filter holder.
4. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 2/3 turn.
5. Open valves (1) (2 places).  
Use Komatsu genuine cartridge.



## CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

## CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor to have the rotor play checked.

## CHECK FOR LOOSE ROPS MOUNT BOLTS

Check that the bolts are not loose and that there is no damage.

If any bolt is loose, tighten it to the following torque.

If there is any damage, replace the bolt with a genuine Komatsu part.

Tightening torque: 785 to 980 N·m (80 to 100 kgf·m, 578.6 to 723.3 lbft)

### EVERY 2000 HOURS SERVICE

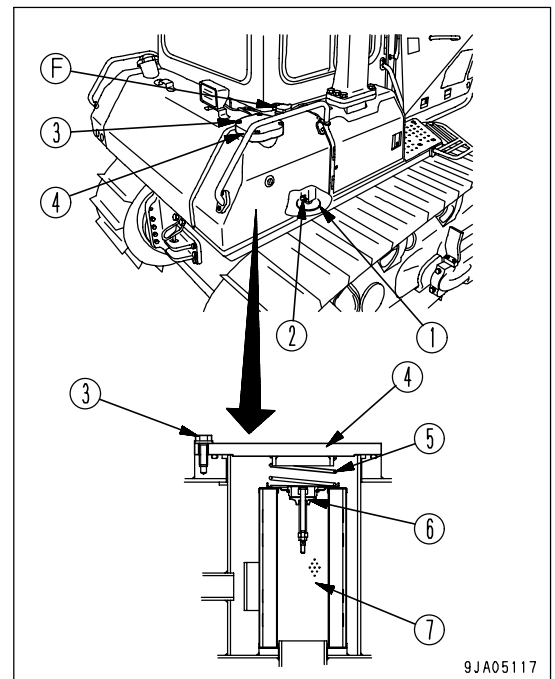
Maintenance for every 50, 250, 500 and 1000 hours service should be carried out at the same time.

### CHANGE OIL IN HYDRAULIC TANK, REPLACE OIL FILTER ELEMENT

**! WARNING**

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

- Refill capacity: 55 liters (14.53 US gal)
1. Lower the work equipment to the ground, then stop the engine.
  2. Turn the cap of oil filler (F) slowly to release the internal pressure, then remove the cap.
  3. Remove the cover (1) at the bottom of the hydraulic tank.
  4. Loosen drain valve (2), drain the oil, tighten drain valve (2) again, then install cover (1). When loosening drain valve (2), be careful not to get oil on yourself.
  5. Remove bolt (3), then remove cover (4).
  6. Take out spring (5), valve (6), and element (7).
  7. Clean the inside of the case, then wash spring (5) and valve (6).
  8. Install new element (7), valve (6), and spring (5).
  9. Install cover (4) with bolt (3).
  10. Refill the specified quantity of oil through oil filler (F).
  11. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-45)".



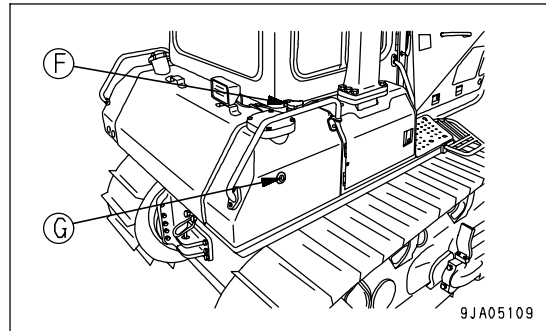
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### REPLACE HYDRAULIC TANK BREATHER ELEMENT

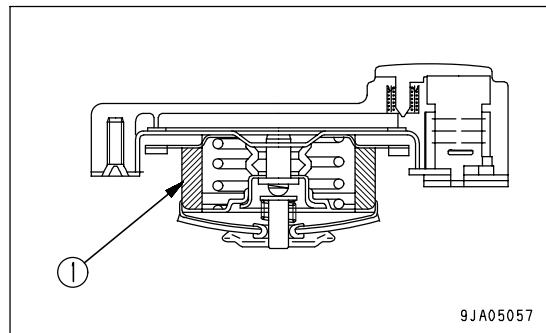
**! WARNING**

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

1. Remove the cap of oil filler (F) at the top of the hydraulic tank.



2. Replace element (1) inside the cap.

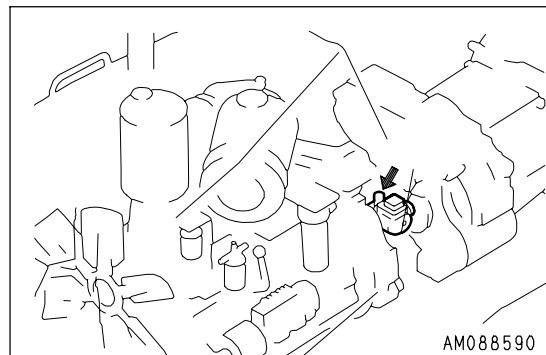


### CLEAN ENGINE BREATHER ELEMENT

**! WARNING**

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the engine breather.
- When using compressed air, there is a hazard that dirt may be blown up and cause serious injury. Always use safety glasses, dust mask, or other protective equipment.

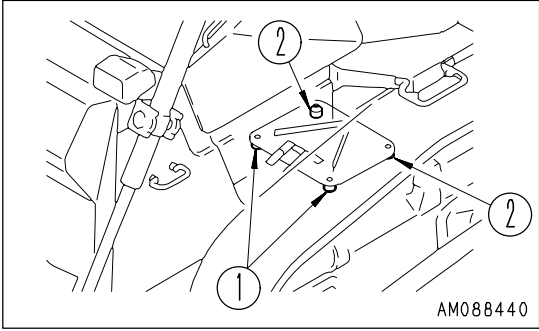
1. Wipe away dust around the breather.
2. Remove breather.
3. Wash the whole breather in diesel oil or flushing oil, then blow it dry with compressed air.
4. Replace the breather O-ring with a new one, coat with engine oil, and install.



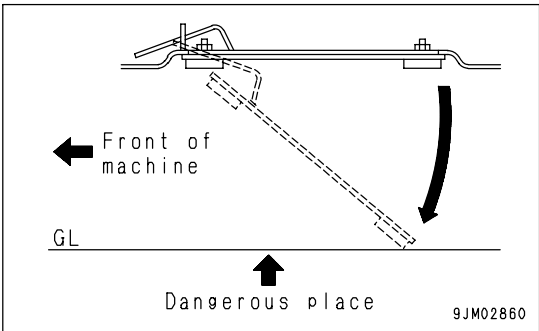
CHANGE OIL IN DAMPER CASE

**WARNING**

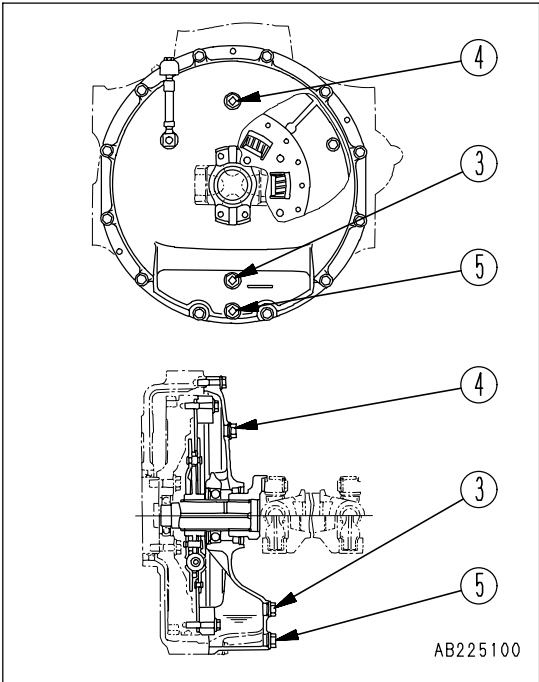
- The parts and oil is very hot just after the operation. Wait until the oil temperature drops, then start the work.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.
- When removing drain plug (5) of the damper case, take care not to get oil over yourself.



- Refill capacity: 1.7 liter (0.45 US gal)
1. Remove the undercover from the rear bottom of the machine body as follows.
    - 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.



2. 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).
3. Add oil through the hole of oil filler plug (4) until the oil level reaches the bottom edge of the hole of oil level plug (3).
4. After refilling the oil, tighten plugs (3) and (4).



**CLEAN, CHECK TURBOCHARGER**

Contact your Komatsu distributor for cleaning and inspection.

**CHECK VIBRATION DAMPER**

Check that there are no cracks or peeling in the outside surface of the rubber.

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

**CHECK ALTERNATOR, STARTING MOTOR**

The brushes may be worn or the bearing may have run out of grease, contact your Komatsu distributor for inspection and repairs.

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

**CHECK ENGINE VALVE CLEARANCE, ADJUST**

Special tools are needed for inspection and maintenance, please contact your Komatsu distributor.

**CHECK INJECTOR**

See Section "A REGULATION AREA (PAGE 4-19)".

**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.

**CHECK INJECTOR**

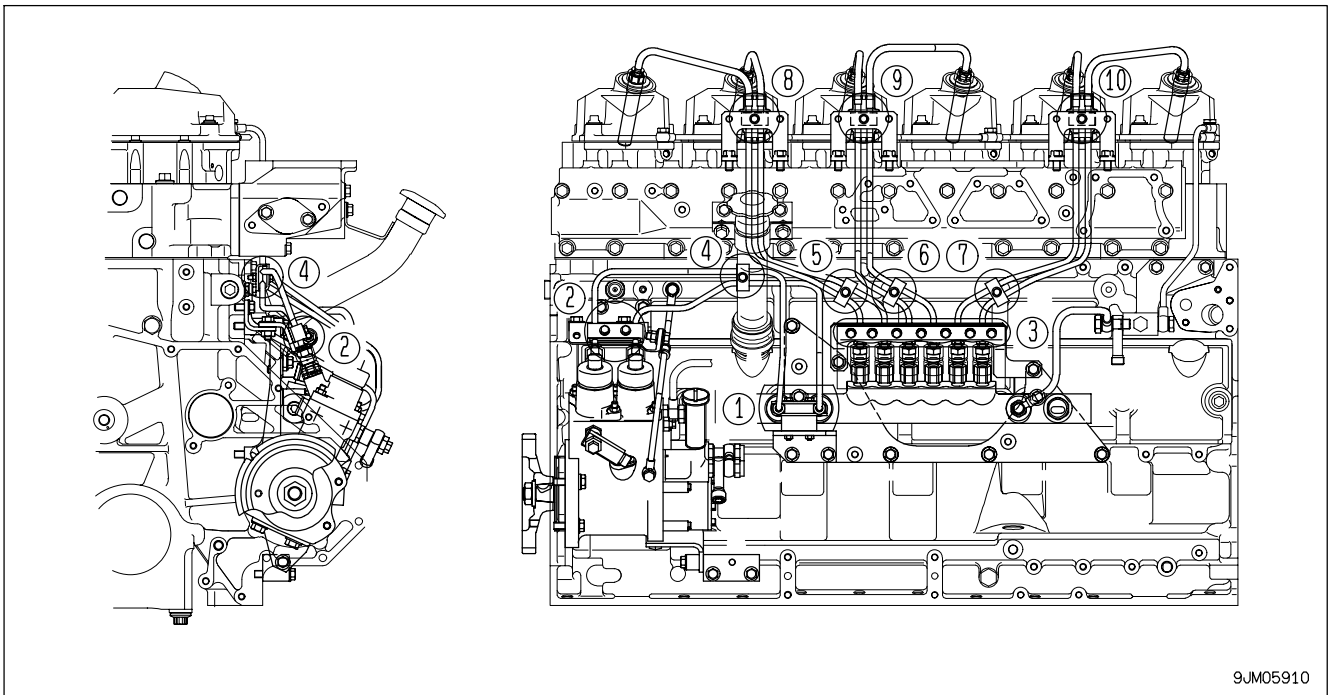
See Section "B REGULATION AREA (PAGE 4-19)".

**REPLACE INJECTOR ASSEMBLY**

See Section "A REGULATION AREA (PAGE 4-19)".

**CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER**

Check visually that there are no loose bolts or hardened the rubber on clamps (1) - (11). If there are any loose bolts or hardened rubber, please contact your Komatsu distributor for replacement.



9JM05910

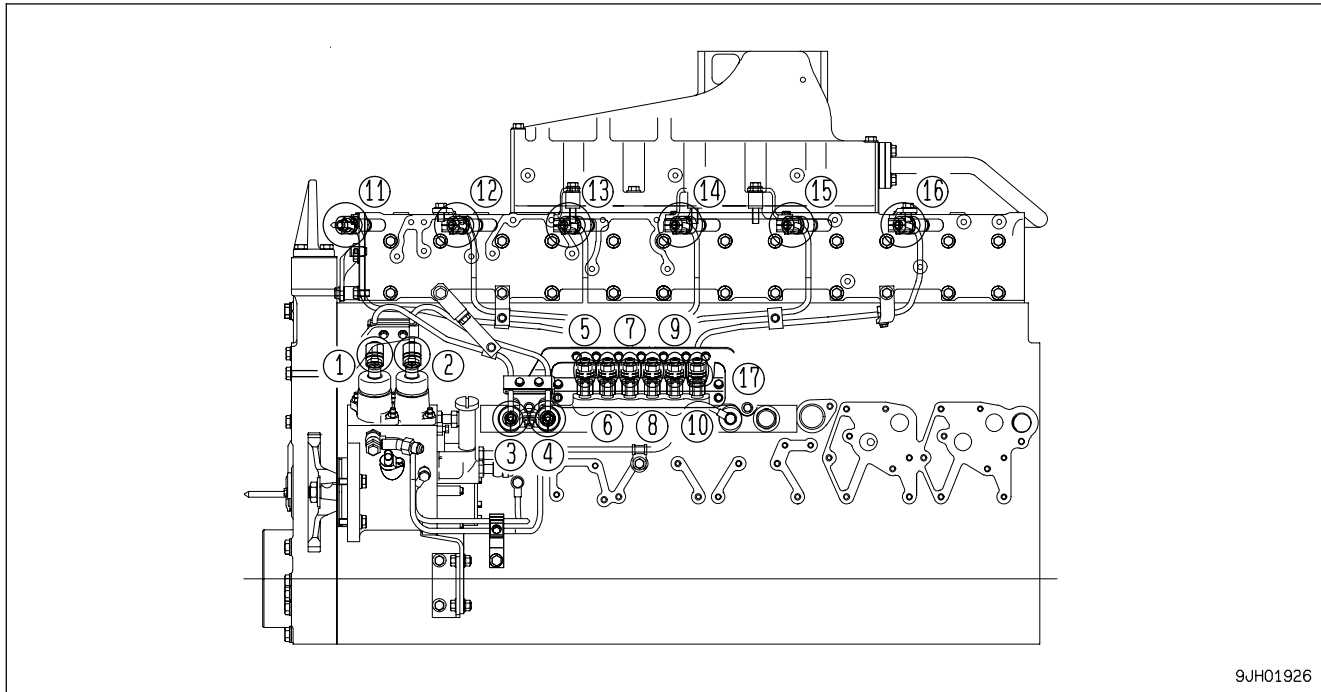
**NOTICE**

If the engine continues to be used when there are loose bolts, hardened rubber, or missing parts, there is danger of damage or breakage occurring due to vibration and wear at the connections of high-pressure piping. Always check that the proper high-pressure piping clamps are correctly installed.



**CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER**

Fuel spray prevention caps (1) - (16) and fuel spray prevention cover (17) are protective parts installed to prevent fire caused by fuel leaking and spraying out on to high temperature parts of the engine. Check visually that there are no missing caps or loose bolts, and feel with your finger to check that the rubber has not hardened. If there is any problem, the problem part must be replaced. Contact your Komatsu distributor for part replacement.



9JH01926

**EVERY 8000 HOURS SERVICE**

Maintenance for every 50, 250, 500, 1000, 2000 and 4000 hours service should be carried out at the same time.

**REPLACE INJECTOR NOZZLE TIP**

See Section "B REGULATION AREA (PAGE 4-19)".

**REPLACE HIGH-PRESSURE PIPING CLAMP**

Contact your Komatsu distributor to have the engine high-pressure clamp replaced.

**REPLACE FUEL SPLAY PREVENTION CAP**

Contact your Komatsu distributor to have the fuel spray prevention cap replaced.

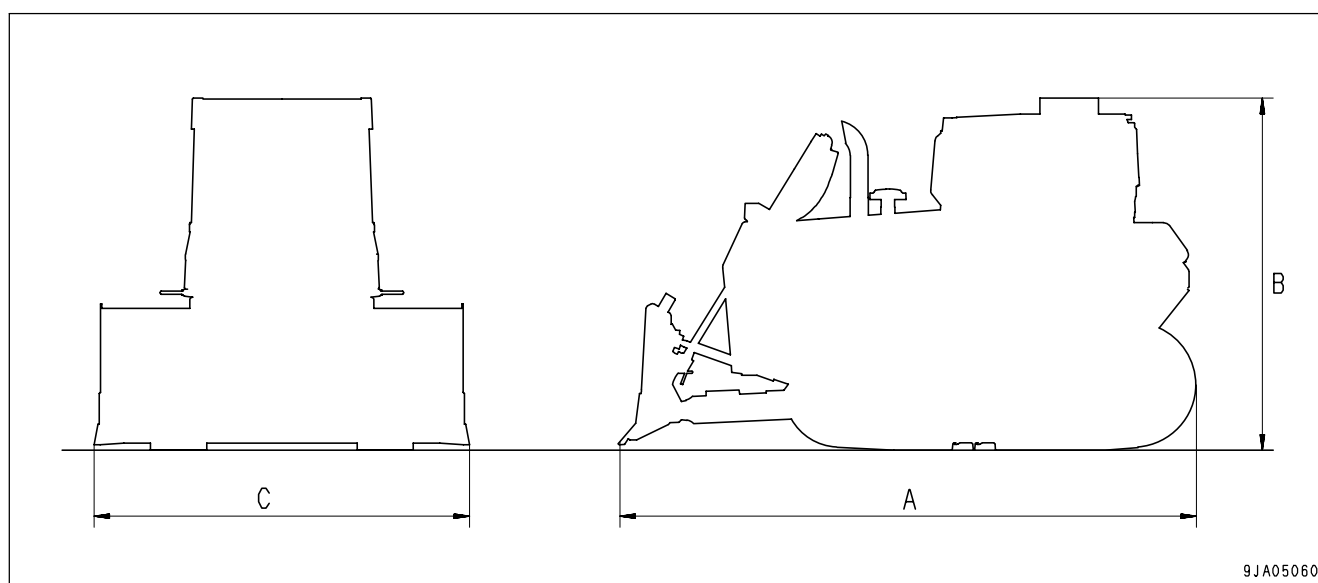


# **SPECIFICATIONS**

# SPECIFICATIONS

Power tiltdozer, ROPS guard, cab, air conditioner

Item		Unit	D65EX-15	D65PX-15	D65WX-15
Machine weight		kg (lb)	19,550 (43,108)	20,950 (46,195)	20,860(45,996)
Name of engine		-	Komatsu SA6D125E-3 diesel engine		
Engine horsepower		Kw{HP}/rpm	140{187}/1,950		
A	Overall length	mm (ft in)	5,210 (17'1")	5,550 (18'3")	5,440(17'10")
B	Overall height	mm (ft in)	3,220 (10'7")	3,255 (10'8")	3,220 (10'7")
C	Overall width	mm (ft in)	3,415 (11'2")	3,970 (13'0")	3,640 (11'11")
Travel speed (1st/2nd/3rd)		Forward	3.9/6.8/10.6 (2.4/4.2/6.6)		
		Reverse	5.0/8.6/13.4 (3.1/5.5/8.3)		



9JA05060

# ATTACHMENTS, OPTIONS

 **WARNING**

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

---

## GENERAL PRECAUTIONS

### PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.



### WARNING

#### General precautions

- Read the instruction manual for the attachment carefully, and do not use the machine before you understand the operation method completely.

If you lose the instruction manual, be sure to order another copy from your Komatsu distributor.

- To prevent serious personal injury caused by misoperation, place your foot on the pedal only when operating the pedal.

#### Precautions for removal and installation

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

- Select a firm, level surface when installing or removing an attachment.
- When working in cooperation with one or more other workers, decide signs and observe them when carrying out the operation.
- When carrying a heavy part (25 kg (55 lb) or more), use a crane.
- When removing a heavy part, always place a support in position before removing it.  
When lifting a load with a crane, be particularly careful of the center of gravity.
- It is dangerous to carry out operations when the load has been raised by a crane. Always lower the load onto a stand and check that it is safe.
- When leaving an attachment removed or installing it, place it in a stable position to prevent it from falling over.
- Never go under a load raised by a crane.

Always stand in a place which is safe even if the load should fall.

#### NOTICE

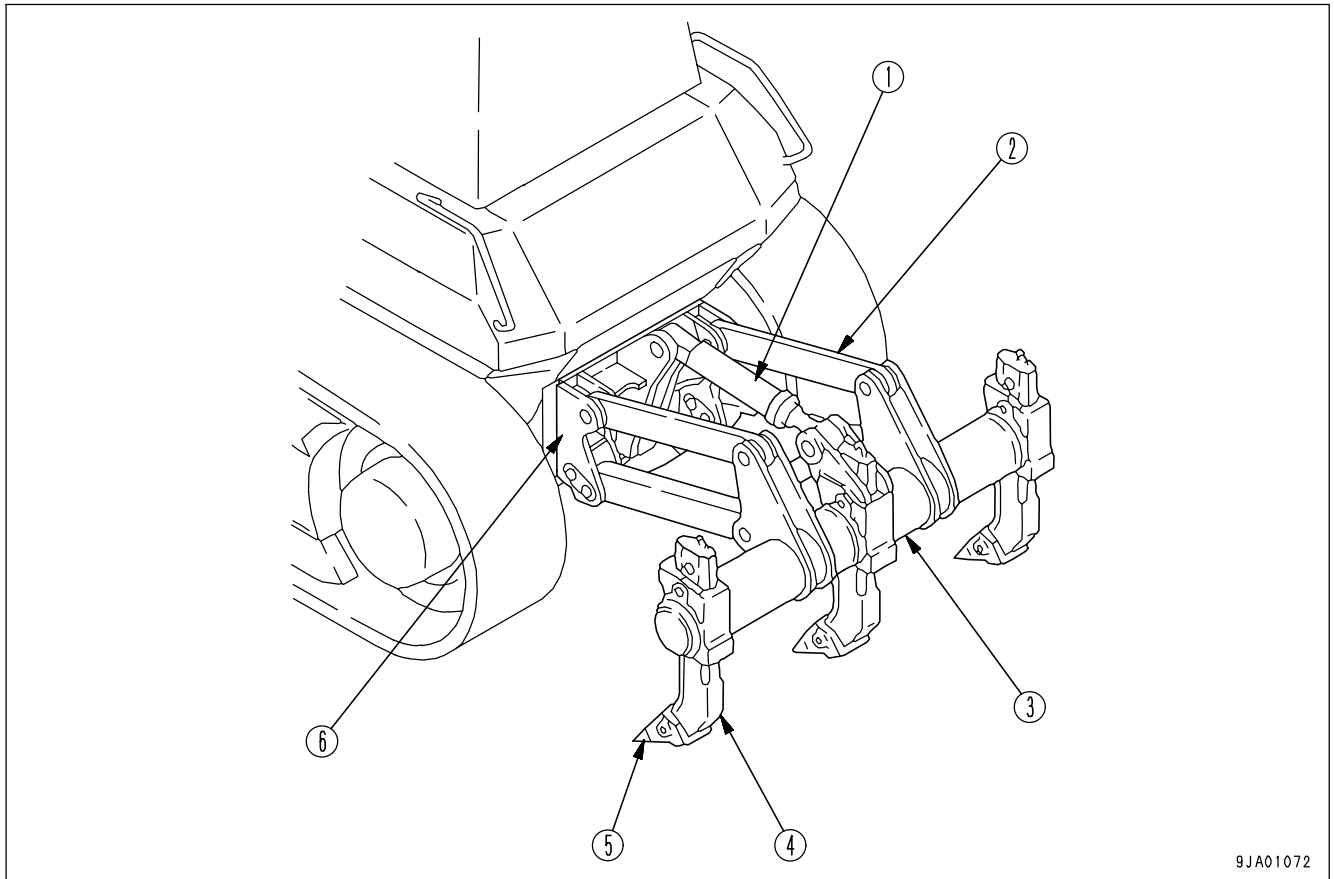
Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

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

## HANDLING HYDRAULIC RIPPER

- This ripper is applicable for the D65EX.

### GENERAL VIEW



9JA01072

(1) Hydraulic cylinder

(2) Link

(3) Beam

(4) Shank

(5) Point

(6) Support



## EXPLANATION OF COMPONENTS

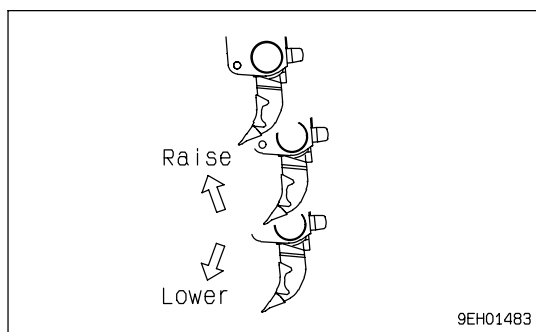
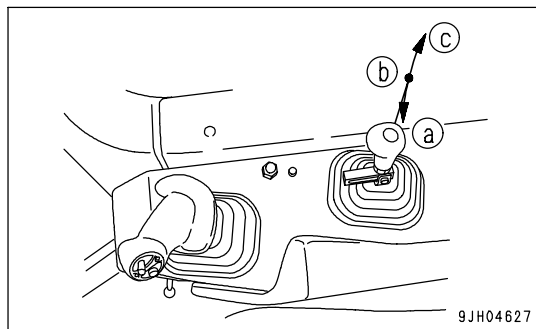
## RIPPER CONTROL LEVER

**WARNING**

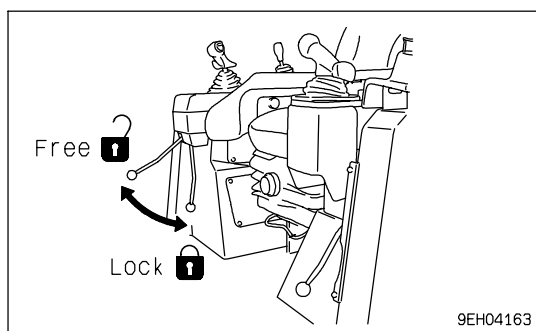
When carrying out inspection or maintenance of the machine, or when parking the machine, lower the ripper to the ground and set the work equipment lock lever to the LOCK position.

This lever is used to operate the ripper.

- (a) RAISE
- (b) HOLD: Ripper is stopped and held in the same position.
- (c) LOWER

**REMARK**

The ripper operation is locked by the work equipment lock lever. For details of the operation of the work equipment lock lever, see "WORK EQUIPMENT LOCK LEVER (PAGE 3-37)".



## OPERATION

### CHECK BEFORE STARTING ENGINE, ADJUST

#### WALK-AROUND CHECK

1. Check for wear of the point at the tip of the shank, check the mounting condition, and check for damage to the rivets. If any abnormality is found, replace or repair.

#### PRECAUTIONS WHEN OPERATING

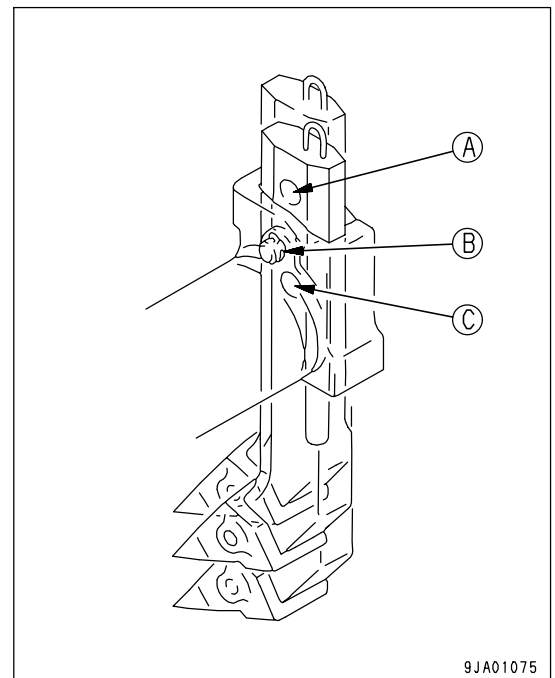
- Travel in low speed and lower the ripper gradually when starting to move the machine off. When the optimum digging depth is reached, move the control lever to the HOLD position.  
Do not dig the shank in deep when starting digging operations.
- During ripping operations, never turn the machine suddenly or travel in reverse. When turning the machine suddenly or traveling in reverse, raise the shank from the ground surface.
- When carrying out digging operations with only one shank, always use the center shank. Remove both side shanks.
- When starting to travel up a steep slope or when reaching the bottom of the slope, the point may touch the ground. On hard ground, there is danger of the point breaking if it touches the ground, so raise the shank to the maximum height.

### ADJUSTING POSTURE OF WORK EQUIPMENT

#### ADJUSTMENT OF DIGGING DEPTH

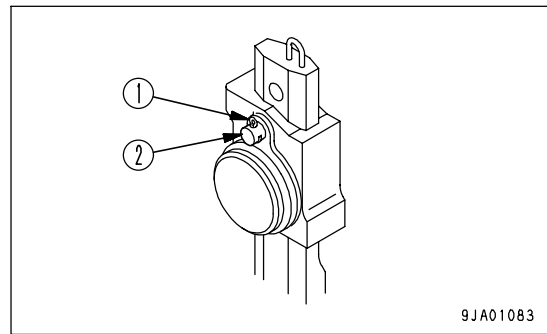
There are mounting holes for the pin in the shank. Select the mounting hole to match the digging depth.

Pin hole position	Use	Max. digging depth
(A)	When there is special need to dig deeply	595mm (23.4 in)
(B)	Normal	485mm (21.9 in)
(C)	When not using ripper	-



When changing the digging depth, do as follows.

1. Remove cotter pin (1).
2. Remove pin (2), change the position of the shank hole, then insert pin (2).
3. Insert cotter pin (1).

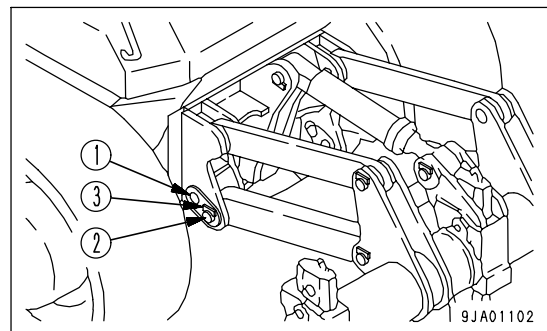


### ADJUSTING DIGGING ANGLE

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

- Digging angle
  - Position (1): 45°
  - Position (2): 55°

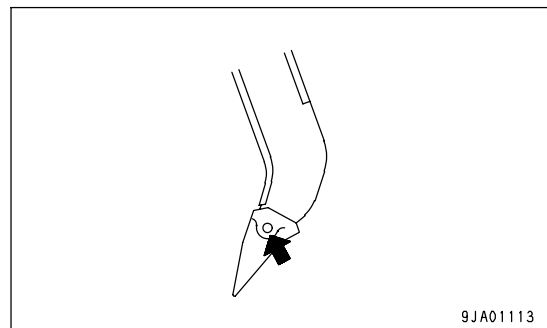
The pin is locked with lock plate (3).



### REPLACEMENT OF POINT

A point is installed to protect the shank. If the point is worn, replace it as follows.

1. Put a pin remover in contact with the pin marked by the arrow and tap with a hammer to remove.
2. Replace the point.
3. Insert the pin half way, then knock it in fully with a hammer.



## TROUBLESHOOTING

### OTHER TROUBLE

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

Problem	Main causes	Remedy
Slow ripper raising and function, lack of ripping force	<ul style="list-style-type: none"> <li>• Improper hydraulic oil</li> <li>• Defective pump</li> <li>• Defective adjustment of relief valve</li> <li>• Defective control valve, safety valve               <ul style="list-style-type: none"> <li>• Defective valve spool</li> </ul> </li> <li>• Defective piston ring, packing, valve</li> <li>• Clogging inside piping</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level, see EVERY 250 HOURS SERVICE</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> </ul>
Cylinder lacks holding power	<ul style="list-style-type: none"> <li>• Leakage of oil from piping, hose</li> <li>• Defective piston ring, packing</li> <li>• Defective piston valve</li> <li>• Defective valve spool</li> <li>• Defective safety valve, suction valve</li> </ul>	<ul style="list-style-type: none"> <li>• Tighten</li> <li>( • Replace)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> </ul>
Oil pressure does not rise	<ul style="list-style-type: none"> <li>• Clogging inside piping</li> <li>• Defective adjustment of relief valve</li> </ul>	<ul style="list-style-type: none"> <li>( • Repair)</li> <li>( • Check, adjust)</li> </ul>

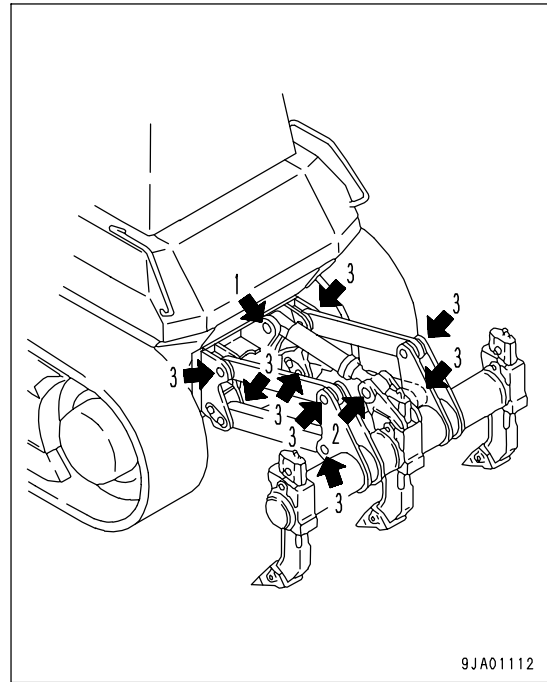
## MAINTENANCE

### EVERY 250 HOURS SERVICE

#### LUBRICATING

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

- (1) Ripper cylinder foot pin (1 place)
- (2) Ripper cylinder rod end pin (1 place)
- (3) Link pin (8 places)



9JA01112

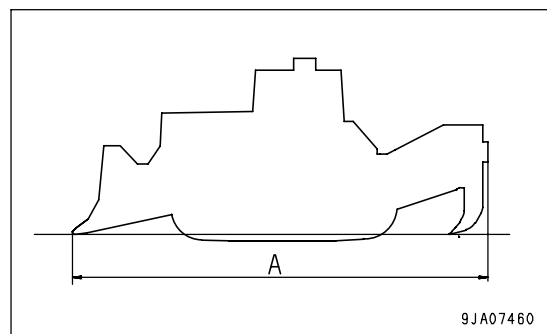
#### CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

1. Stop the machine on level ground.  
Set the blade perpendicular and lower it the ground, lower the ripper to the ground, then stop the engine.
2. For details of checking the oil level in the hydraulic tank, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-45)".

## SPECIFICATIONS

Power tiltdozer, ROPS guard, cab, air conditioner

	Item	Unit	D65EX-15	D65WX-15
	Operating weight (not including operator)	kg (lb)	21,190 (46,724)	22,050 (48,620)
	Weight of ripper as individual part	kg (lb)	1,610 (3,550)	1,610 (3,550)
A	Overall length	mm (ft in)	6,480 (21'3")	6,665 (21'10")
	No. of shanks		3	3

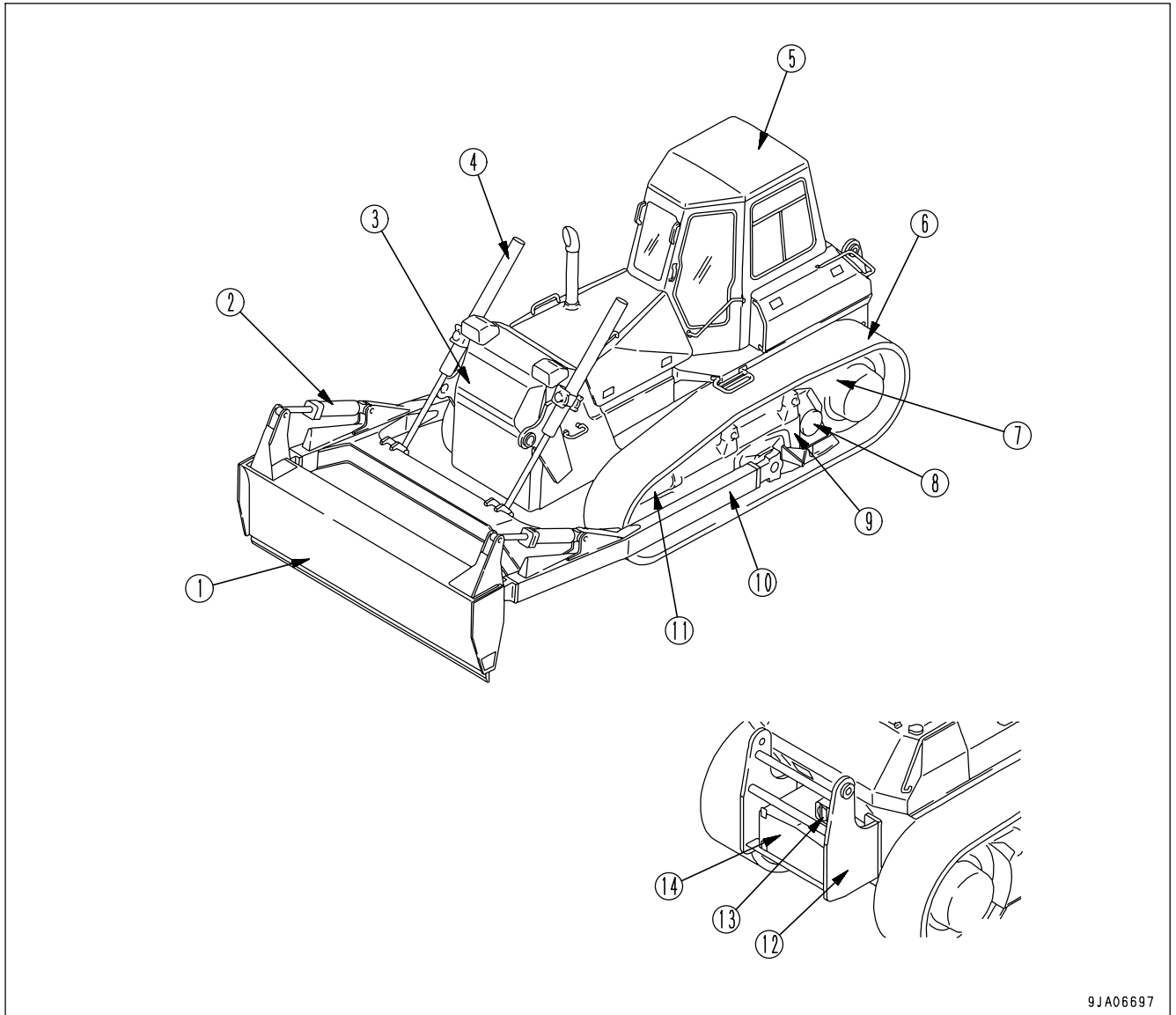


9JA07460

# HANDLING TRIMMING DOZER

This trimming dozer is applicable for the D65EX.

## GENERAL VIEW



9JA06697

- |                       |                                    |
|-----------------------|------------------------------------|
| (1) Blade             | (8) Pivot shaft                    |
| (2) Trimming cylinder | (9) Track frame                    |
| (3) Radiator mask     | (10) Frame                         |
| (4) Lift cylinder     | (11) Idler                         |
| (5) Cab               | (12) Rear guard                    |
| (6) Track shoe        | (13) Red back-up lamp              |
| (7) Sprocket          | (14) Extra fuel tank (if equipped) |

## EXPLANATION OF COMPONENTS

### BLADE CONTROL LEVER

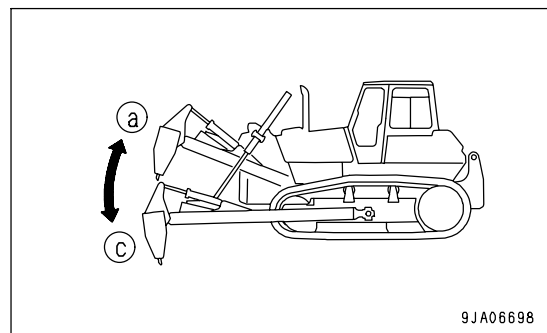
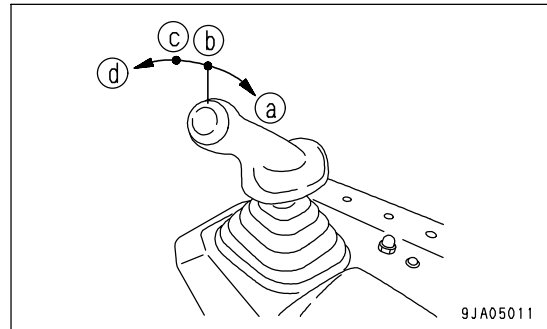
This lever is used to raise or trim the blade.

- 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.

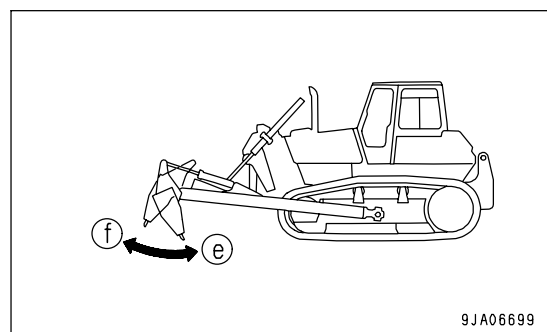
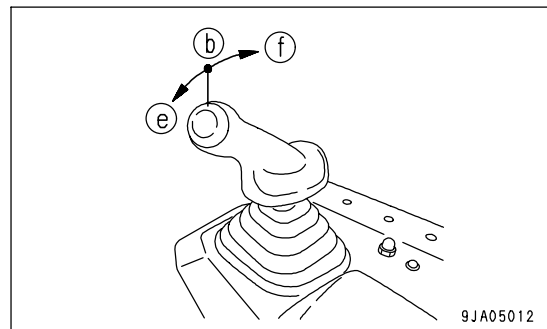
### REMARK

- If the lever is in the FLOAT position, even when it is released, it does not return to the HOLD position, so return it by hand.
- If the engine is stopped when the control lever is in the FLOAT position, the lever is returned automatically to the HOLD position.
- In low temperatures, it may take a short time for the blade control lever to be held in the FLOAT position, so hold the lever in position for at least 1 second.



- Trimming control

- (b) HOLD : Blade is stopped and held in this position.  
 (e) REAR : Blade inclines to rear direction.  
 (f) FRONT: Blade inclines to front direction.

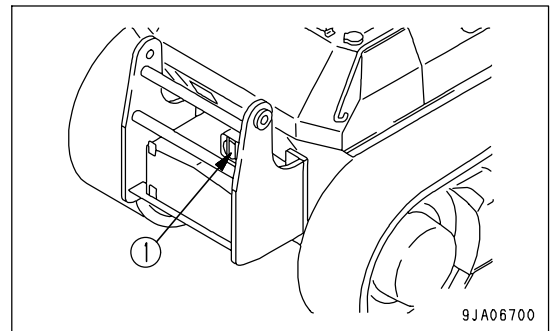
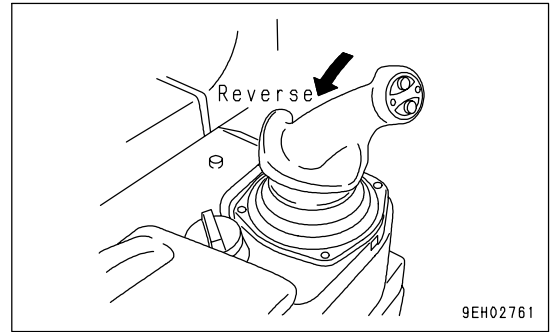


**RED BACKUP LAMP**

If the steering, forward-reverse, gear shift lever is set to the REVERSE position, the alarm sounds intermittently to warn people around the machine that the machine will travel in reverse. Red backup lamp (1) lights up that the same time.

**REMARK**

The alarm will continue to sound and the red backup lamp will remain lighted up until the steering, forward-reverse, gear shift lever is moved to the N or FORWARD position.





## OPERATION

### WORK POSSIBLE USING TRIMMING DOZER

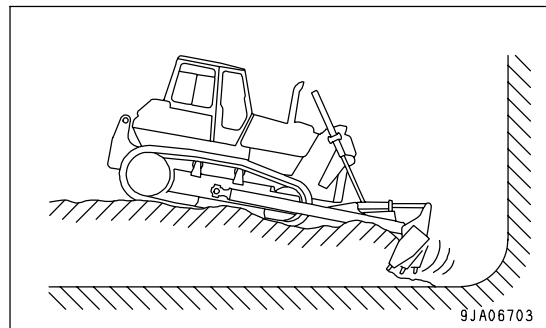
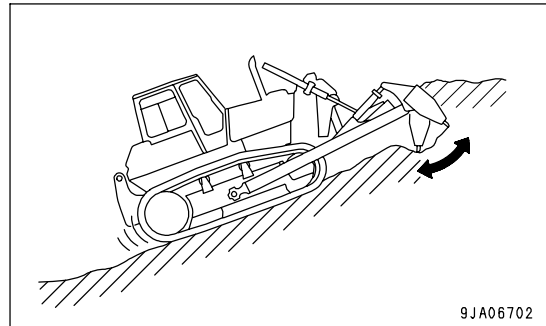
#### TRIMMING

By tilting the blade to the front or rear, it is possible to smoothly push or scoop up a variety of loose materials inside the ship's hold, ranging from heavy materials such as iron ore to comparatively light materials such as coal, salt, sugar, and grain.

#### REMARK

It is possible to operate easily using the steering, forward-reverse, gear shift lever together with the brake pedal.

This is a power-turn machine, so it can carry out pivot turns and counterrotation turns smoothly to enable it to operate right into the corners of confined ship's holds.



### PRECAUTIONS WHEN OPERATING

1. This machine must not be used for earth moving or digging operations.
2. Never move the machine to the front and rear when the machine is jacked up by the blade.

## LIFTING MACHINE

**WARNING**

- Do not lift the machine with any worker on it.
- Use wire ropes having sufficient strength for the weight of the machine.
- Lift the machine only in the position shown below. If it is lifted in another position, it may be unbalanced.
- Lift the machine level.

**NOTICE**

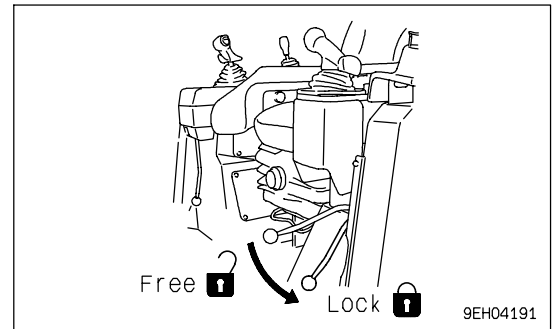
Use protectors, etc. so that the wire ropes will not be broken at sharp edges or narrow places.

For details of the weight, see "SPECIFICATIONS (PAGE 6-19)".

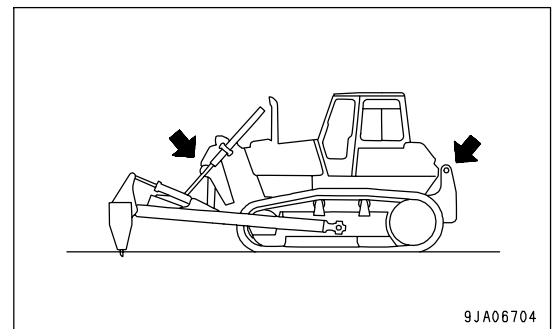
**PROCEDURE FOR LIFTING OPERATIONS**

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

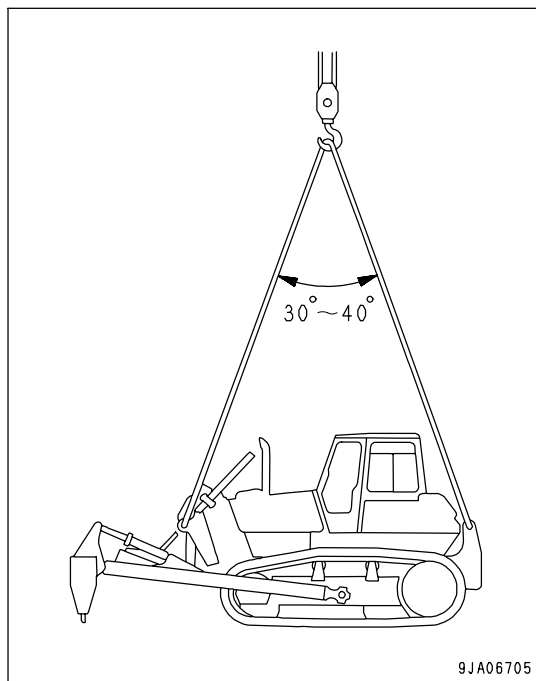
1. Stop the engine and set the parking brake lever to the LOCK position.
2. Close the cab door, window and side cover securely.



3. Use a wire rope and sling that matches the weight of the machine.
4. Install shackles to the lifting holes at the top of the rear guard and the front of the radiator guard then fit the wire.
5. When applying tension to the wire with a crane, fit wooden blocks at the points where the wire touches the chassis.



6. Set the lifting angle of the wire rope to  $30^{\circ}$  -  $40^{\circ}$ , then lift the machine slowly.



7. After setting the wire ropes, lift up the machine and stop at 100 to 200 mm (3.9 to 7.9 in) above the ground, and check that the wire ropes are not slack and the machine is level, then lift up slowly.

## MAINTENANCE

### CAUTION

- When opening the engine side cover to carry out inspection and maintenance of machines equipped with a trimming dozer, grip the lift cylinder hose by hand and move it to the outside, then open the cover until it is locked.
- The cover is also held by a gas damper, but there are cases where the gas damper may not be able to hold it in cold weather, so always open the cover until it is locked.

## CHECK BEFORE STARTING

### CHECK FUEL LEVEL (MACHINE EQUIPPED WITH EXTRA FUEL TANK)

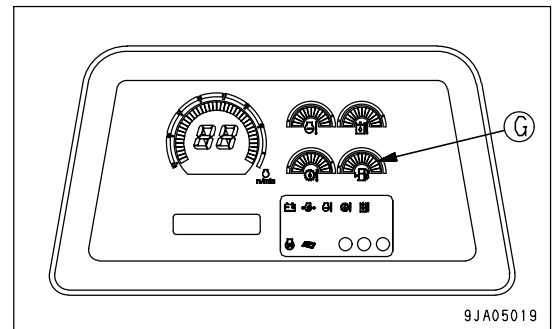
### WARNING

When adding fuel, never spill the fuel or let it overflow. It will cause fire.

If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.

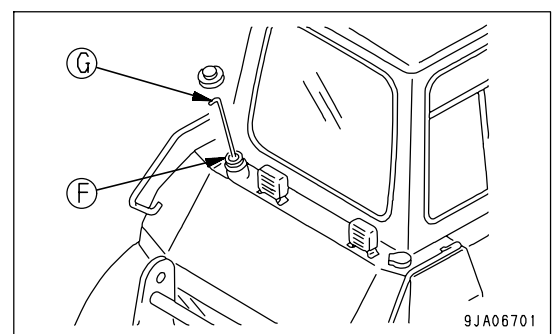
Fuel is highly flammable and dangerous. Never bring flames near fuel.

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



2. Remove the cap of the top tank, the use dipstick (G) to check the level of the fuel in the top tank.
3. After completing work, fill the fuel tank through fuel filler port (F).

Fuel capacity: Upper tank : 415 liters (109.64 US gal)  
 Extra tank : 110 liters (29.06 US gal)  
 Total : 525 liters (138.70 US gal)



#### REMARK

After completion of operations, add fuel through fuel filler port (F) to fill the tank.

4. After adding fuel, tighten the cap securely.

#### REMARK

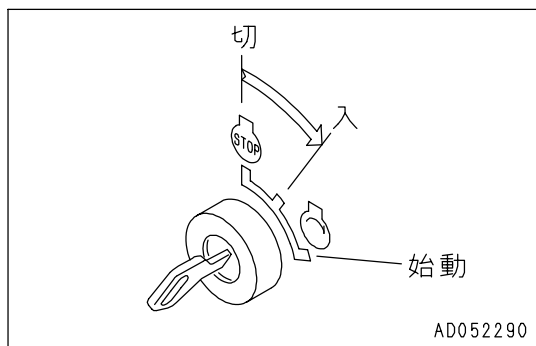
- The top tank and extra tank are connected, so if fuel is added through fuel filler port (F) of the top tank, it is supplied first to the extra tank. When the extra tank is full, the fuel is supplied to the top tank.
- The fuel gauge on the monitor panel shows the condition of the extra tank, regardless of the amount of fuel in the top tank. Use dipstick (G) to check the amount of fuel in the top tank.

## CHECK OF OPERATION OF BACKUP ALARM AND RED BACKUP LAMP

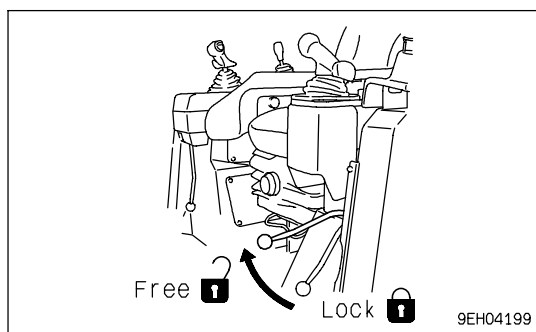
Check that the backup alarm works properly and that the red backup lamp lights up.

If the backup alarm does not work or the lamp does not light up, there is probably a failure or disconnection in the wiring, so please ask your Komatsu distributor to carry out repairs.

1. Turn the starting switch to the ON position.



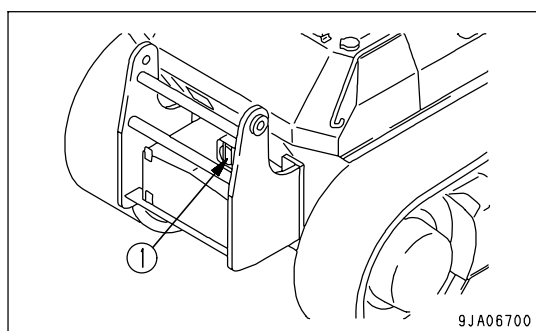
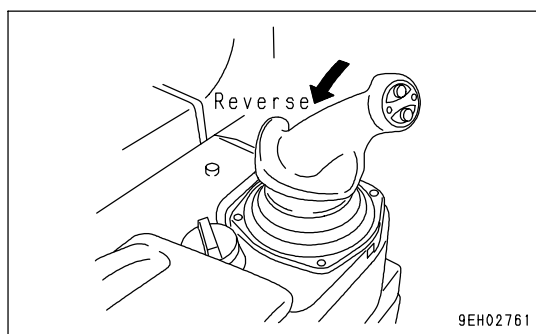
2. Set parking brake lever to the FREE position.



3. Set the steering, forward-reverse, gear shift lever to the REVERSE position.

The alarm must immediately sound intermittently and red backup lamp (1) must light up.

The alarm will continue to sound and the red backup lamp will remain lighted up until the steering, forward-reverse, and gearshift lever is moved to the N or FORWARD position.



## WHEN REQUIRED

### REPLACE CUTTING EDGE

Replace the cutting edge before it wears to the end face of the blade.

The cutting edge is welded to the blade.

When replacing the cutting edge, please ask your Komatsu distributor to carry out the replacement operation.

Cutting edges part no.: 144-978-1120 (1 piece; weld)

Weight: 100 kg (221 lb)/piece

## EVERY 50 HOURS SERVICE

### DRAIN WATER, SEDIMENT FROM FUEL TANK (MACHINE EQUIPPED WITH EXTRA FUEL TANK)

Carry out this check before operating the machine.

- Prepare a container to catch the fuel that is drained.

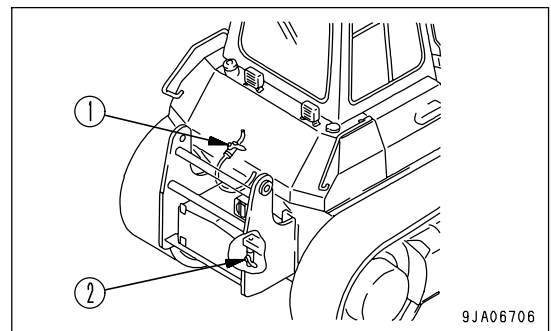
1. Open the inspection cover at bottom of upper fuel tank and loosen valve (1), and drain sediment accumulated on the bottom together with mixed water and fuel.

When doing this, be careful not to get fuel on yourself.

2. When clear fuel comes out, close drain valve (1).
3. Loosen valve (2) at the bottom of the extra tank and drain sediment accumulated on the bottom together with mixed water and fuel.

When doing this, be careful not to get fuel on yourself.

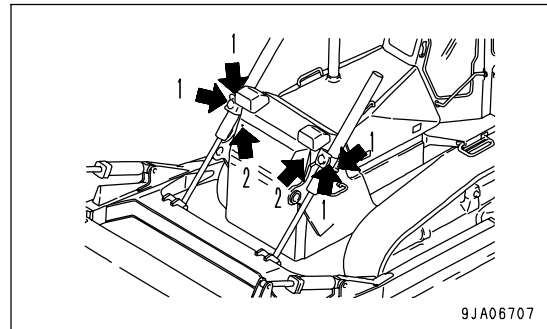
4. When clean fuel comes out, close drain valve (2).



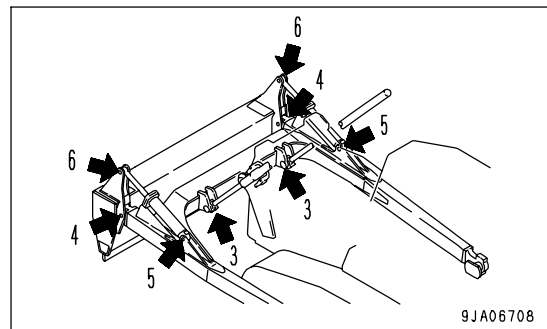
**EVERY 250 HOURS SERVICE****LUBRICATING**

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.

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



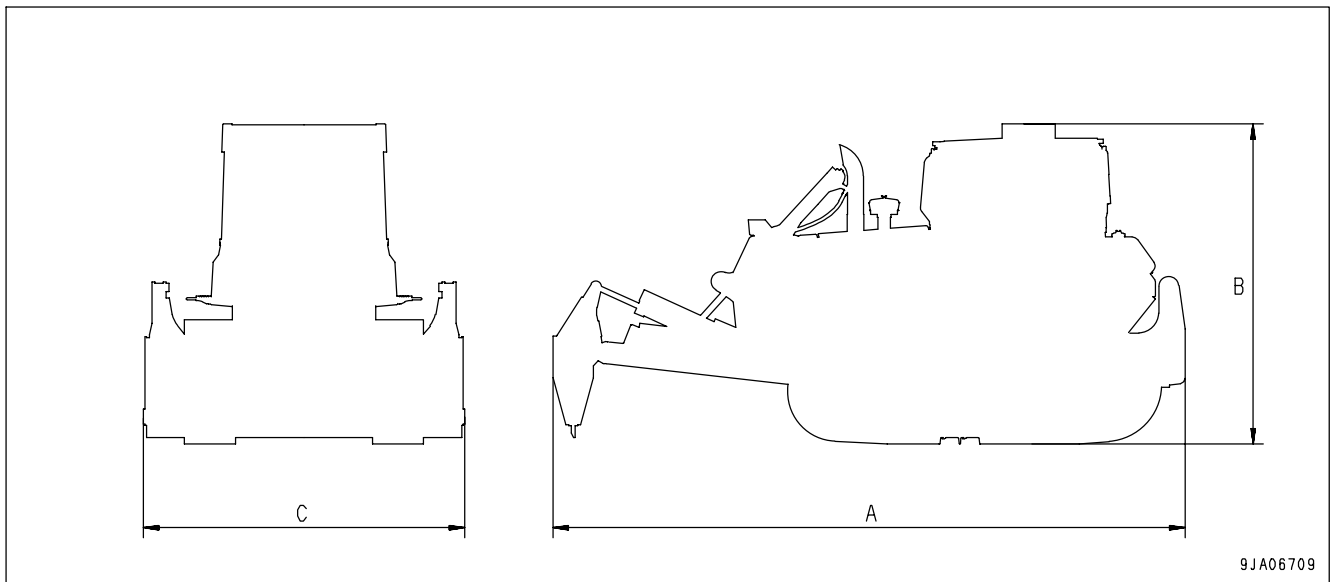
- (3) Lift cylinder ball joint (2 places)
- (4) Frame shaft (2 places)
- (5) Trimming cylinder bottom shaft (2 places)
- (6) Trimming cylinder piston rod (2 places)



**SPECIFICATIONS**

With trimming dozer and ROPS cab

	Item	Unit	D65EX-15
	Machine weight	kg (lb)	20,900 (46,085)
A	Overall length (Incl. rear guard)	mm (ft in)	6,475 (21'3")
B	Overall height	mm (ft in)	3,220 (10'7")
C	Overall width	mm (ft in)	3,210 (10'6")
Blade	Maximum lift above ground	mm (ft in)	1,610 (5'3")
	Maximum drop below ground	mm (ft in)	685 (2'3")
	Tilting angle, forward	Degrees	29
	Tilting angle, rearward	Degrees	22





## DELUXE SEAT

(Rotating seat)

### ADJUSTMENT



### WARNING

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

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

#### (A) Fore-and-aft adjustment

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

Fore-aft adjustment: 200 mm (7.9 in) (10 stages)

#### (B) Weight and height adjustment of seat

- Turn knob (2) under the seat so that weight adjustment indicator (3) displays the green range. The height can be adjusted by turning the knob (2) while the green range is displayed.
- Turn the knob clockwise to raise the seat and turn the knob counterclockwise to lower the seat.

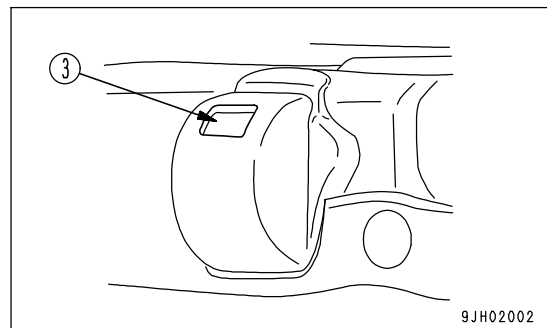
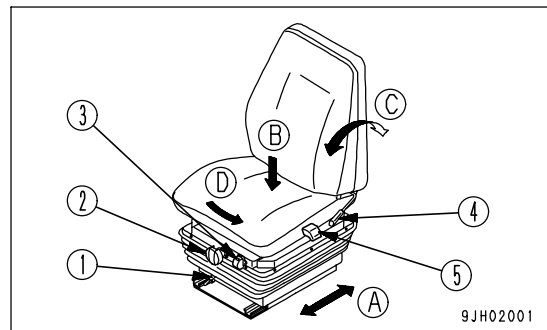
Height adjustment range: stepless, 75 mm (3 in)

Weight adjustment range: 50 to 130 kg (110 to 237 lb)

#### (C) Adjust reclining angle

##### REMARK

When the seat is pushed forward, the available reclining angle becomes greater; when the seat is pushed back, the available reclining angle becomes smaller. When moving the seat back, return the seat back to its original position before moving the seat.



Pull up lever (4), set the seatback to a position where it is easy to operate, then release the lever.

(D) Adjusting direction of seat

**NOTICE**

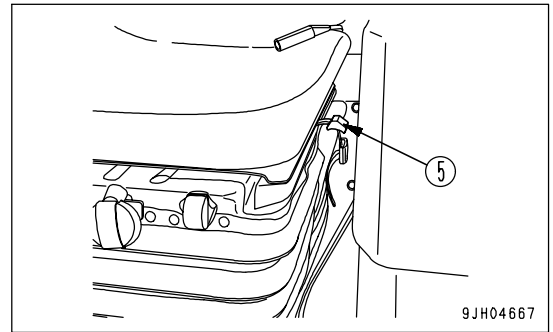
Depending on the position of the seat, when changing the direction of the seat, it may contact the console or other parts.

Be extremely careful.

Pull up lever (5) to unlock the seat, and the seat can be turned by hand to the position of 15° on the right.

After changing the direction of the seat, return the lever securely to lock the seat.

- Change the direction of the seat to the right for the ease of operation of the ripper.



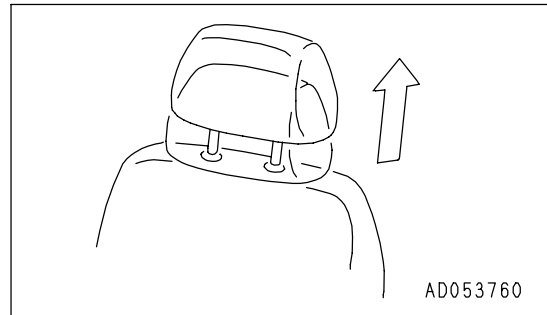
## HEADREST

### Removal of headrest

Pull up the headrest.

#### REMARK

The headrest cannot be fixed to halfway.



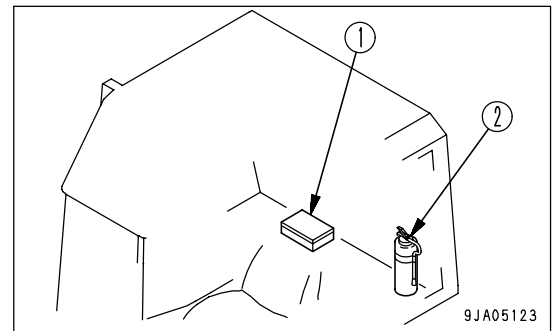
## EQUIPPING FIRE EXTINGUISHER AND FIRST-AID KIT

Equipping the fire extinguisher and the first-aid kit at the illustrated position needs brackets (if equipped).

The fire extinguisher and the first-aid kit can be installed to the positions shown in the following illustration.

- (1) First-aid kit
- (2) Fire extinguisher

For parts that are required to install them in your machine, please contact your distributor.





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D65EX-15, D65PX-15, D65WX-15 GALEO BULLDOZER

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